AVIATION AND AIRCRAFT JOURNAL

NOVEMBER 28, 1921 VOL. XI. NO. 22

Member of the Audit Bureau of Circulations

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THE GARDNER, MOFFAT COMPANY, Inc., *Publishers*

HIGHLAND, N. Y.

225 FOURTH AVENUE, NEW YORK

SUBSCRIPTION PRICE: FOUR DOLLARS PER YEAR. SINGLE COPIES FIFTEEN CENTS. CANADA, FIVE DOLLARS. FOREIGN, SIX DOLLARS A YEAR.

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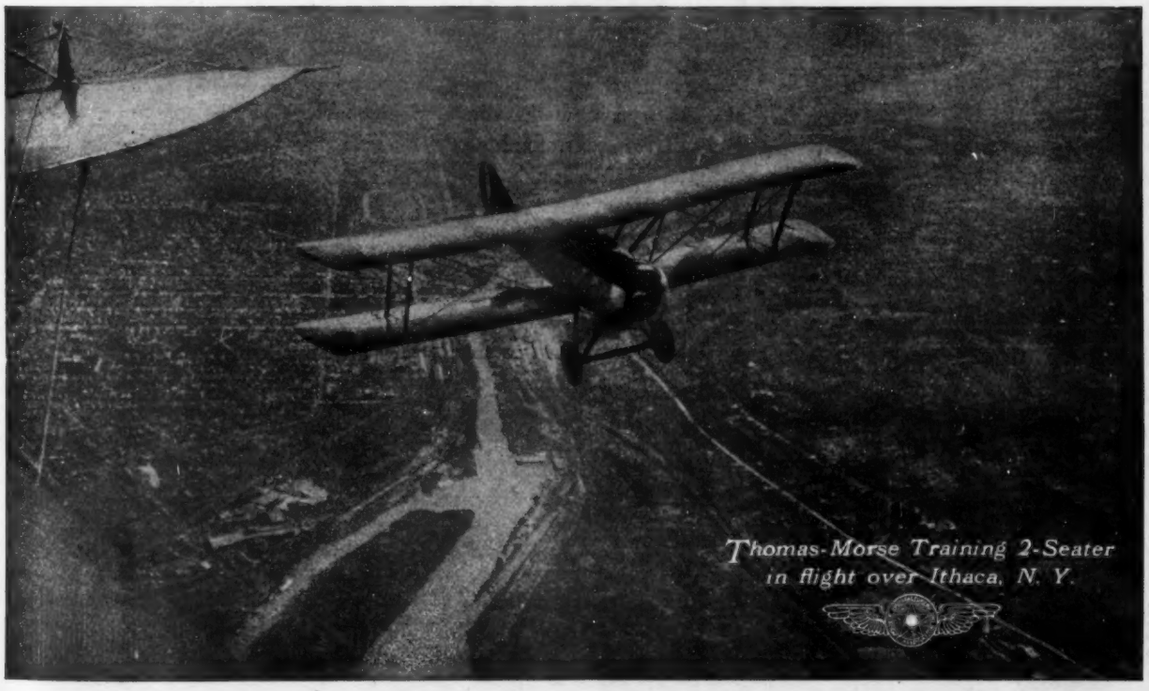
ISSUED EVERY MONDAY. FORMS CLOSE TEN DAYS PREVIOUSLY. ENTERED AS SECOND-CLASS MATTER NOV. 22, 1920, AT THE POST OFFICE AT HIGHLAND, N. Y., UNDER ACT OF MARCH 3, 1897.

THOMAS-MORSE AIRCRAFT CORPORATION



Thomas-Morse Training 2-Seater in flight over Ithaca, N. Y.

THOMAS-MORSE AIRCRAFT CORPORATION

On Its Metal

"BUILT LIKE A YACHT" once was a common saying to express highest praise for fine workmanship. All men knew that the ship builder was called upon to make joints better than the carpenter, finish wood finer than the cabinet maker, and forge metal with more skill than the blacksmith.

Airplanes call for all this and more. The Glenn L. Martin Company have found it necessary to organize special departments, construct special tools and train picked men in order to insure the perfection of work which has to go into The Glenn L. Martin Bomber. In the photograph shown, trained machinists assemble and complete the smaller metal parts. The Inspection Department allows no margin of error—each part, no matter how small, must comply exactly with the engineering drawing, and each must fit with absolute accuracy to its respective place.

It is the faithful application of these methods which makes The Glenn L. Martin Bomber the acknowledged superior war plane of America.

THE GLENN L. MARTIN CO.

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AVIATION AND AIRCRAFT JOURNAL

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Vol. XI NOVEMBER 28, 1921 No. 22

Safe Aerial Transportation

THE first annual report of operations issued by Aeromarine Airways, Inc., which is reproduced in this issue deserves more than passing attention from those concerned with the development of commercial aviation. Here is a document which affords irrefutable proof that air transport can be made as safe, if not more so, than the older means of transportation.

If it is considered that the operations covered by this report include a great number of flights which were undertaken over stretches of country where ground organization was totally lacking, the showing made by the Aeromarine flying boats will only be better appreciated. While it is undoubtedly true that seaplanes require much less in the nature of ground organization than land machines, since any body of water constitutes a landing place for emergencies, it seems necessary to point out that flying boats require supply depots and weather forecasting to no less an extent than land going airplanes. Hence, when the Santa Maria circum-navigated one half of the United States by way of the Atlantic Coast, the Hudson, the Great Lakes and the Mississippi, that flying boat accomplished pioneering work of no mean value. That this 7000-mile flight was effected without any noteworthy incident en route, and without requiring shelter for the machine, is a high testimonial both to the airworthiness and seaworthiness of this type, and to the professional skill and devotion of the operating personnel, in the air as well as on the ground.

It is demonstrations like these which will convince the not-yet-flying public of the safety, the reliability and the comfort of civil air transport, notwithstanding the aerial acrobats whose activities tend to demonstrate the contrary.

Federal Air Legislation

WE have so often pointed out in these columns the evils of unregulated civil flying that a repetition of this theme might appear superfluous to the reader. Yet, as months pass by without any government agency stepping in to put a check to the unbridled activities of "wing walkers" and the like, it seems necessary once more to call the attention of Congress to the urgent need which exists for a federal regulation of air navigation.

The introduction in the House, by Representative Hicks, of the Wadsworth Bill, gives renewed impetus to this question. Our readers are aware of the fact that this bill provides for a Bureau of Civil Aeronautics which would have power to regulate air navigation in all parts of the United States. The question has been raised in this connection whether the enactment of federal air legislation would not constitute an infringement of the sovereignty of the states which form the Union. It is obvious that if such were the case the passage of federal air legislation would require a constitutional amendment.

The lengthy procedure which such a measure necessitates would, of course, greatly retard the advent of federal air legislation, with the added threat that several States might indefinitely block the passage of the relative constitutional amendment. The address made by Major Davis before the American Bar Association at its meeting in Cincinnati comes in time to dispel these fears. Major Davis points out that the theory of federal air legislation being contingent upon a constitutional amendment "is founded solely upon the premise that the air is owned absolutely by the surface owner and that all flight over such air space constitutes trespass." He continues saying that a careful examination of the authorities will show that this is not law, but merely a theory which has come down to us from mediaeval days, and that the codes of all countries treat the land owner's right to the air space above his land as subject to a right of passage by aircraft.

Major Davis rightly states that the subject of air navigation is national in its character to such an extent as to require uniformity of regulation effecting all states alike. He also urges that the United States ratify the International Air Navigation Convention, which our representatives signed with certain reservations covering possible constitutional limitations, and that federal air legislation be based on the provisions of this convention.

These views we have always defended on the ground that the ever growing speed and range of aircraft will make it increasingly necessary to have not only one set of aerial law applicable to every nation, or each continent, but to the whole world, as well. The International Convention, imperfect though it may be, affords this instrument of world wide aerial regulation, and its application by France and Great Britain, to mention but the principal signatories, has proven a great boon to commercial aviation in those countries. Similar action by the United States may be expected to furnish like results.

Fire Fighting Airplanes

HENRY FORD'S newspaper, the *Dearborn Independent*, seems to hold the opinion that aerial bombs can not only sink battleships but revolutionize fire fighting. It has taken seriously the experiments of Parisian aviators who claim that they can drop bombs which when they explode will fill the air with gas which will put out the fire in burning buildings.

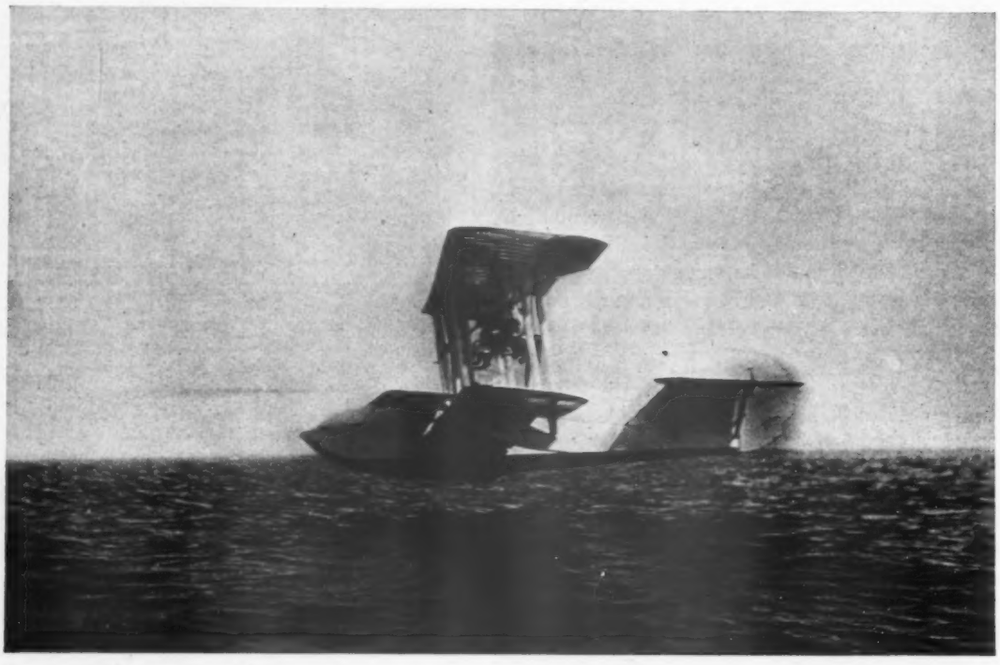
It is rarely that anything in aeronautics, no matter how extraordinary, is not discussed with credulity by some publication. But until such bombs which can be easily thrown into buildings by other means are successful in stopping conflagrations, it would appear too early to consider the dropping of such anti-incendiary gases from altitudes that even fire fighting airplanes should be required to fly over cities.

Aeromarine Airways Show Safe Operation

The first report of commercial aviation operations ever made in the United States has been released by the Bureau of Aeronautics, Navy Department. The report covers the operation of the Aeromarine-Navy flying boats in the commercial transportation of passengers, mail and freight for the period commencing Oct. 27, 1920 and ending Oct. 27, 1921.

A Remarkable Record of Safety

During this period of twelve months fifteen Aeromarine flying boats were operated by the Aeromarine West Indies Airways, Inc., which inaugurated on Nov. 1, 1920, a daily passenger and mail service between Key West, Fla., and Havana, Cuba, and by its successor, the Aeromarine Airways, which considerably developed aerial sight-seeing services and did a large amount of pioneering work by sending its flying boats on long trips across the country wherever bodies of water are available.



AEROMARINE MODEL 50 FLYING BOAT, AN ENCLOSED THREE-SEATER, NOW FITTED WITH THE NEW AEROMARINE 190 HP. TYPE U ENGINE

The records show that the fifteen flying boats which the two companies operated covered in twelve months a total distance of 95,020 miles, and carried 6,814 passengers and 29,002 lb. of mail and freight without a single accident. This truly remarkable showing, which compares very favorably with the performance of European air lines, is an excellent demonstration of the safety afforded by flying boats owing to the fact that every body of water is an emergency landing field.

Following are some interesting details regarding the performance of the Aeromarine "White Fleet."

Six eleven-passenger flying cruisers of F-5L type in operation carried 1044 passengers 42,000 miles in the air and transported 24,002 lb. of mail and 5000 lb. of freight and baggage, exclusive of crews.

Six Navy Coast Patrol five-passenger flying boats of HS-2L type carried 4762 passengers 34,920 miles in the air, exclusive of crews.

Three Aeromarine Model 50 three-place flying boats carried 1008 passengers 18,100 miles, exclusive of pilots.

Not a single passenger or employee was injured during these operations. The schedule was maintained throughout with the exception of four forced landings during adverse weather conditions which caused only slight delays. These delays were less than those suffered by railroads in slight snowstorms.

The flying boat Nina was torn from moorings one night in Havana harbor during a terrific gale, blown against some rocks and damaged beyond repair. No one was aboard at the time.

The services maintained include Key West-Havana; Florida-Bahama Islands; New York, Atlantic City and New England ports; New York Sight Seeing; New York-Albany; Great Lakes Region; Mississippi River Valley.

One Flying Boat in 7500-Mile Flight

The eleven-passenger Navy F-5L flying boats operated in Key West-Havana service during the winter months, after which four of them were laid up for the summer. The remaining boat, Santa Maria, then undertook a flight from Key West up the Atlantic coast to New York, up the Hudson River, over lakes George and Champlain to Montreal, along the Great Lakes to Chicago, and thence by way of Illinois and Mississippi rivers to New Orleans, thence along the Gulf to Key West, a total distance of seven thousand miles.

Of the six HS-2 flying boats, four were in constant operation and two were in reserve. One of these boats made a complete circumnavigation of the Great Lakes flying 7491 miles and carrying five passengers; another covered the New England States.

From Palm Beach to Nassau

For operations during the coming year six of the Aeromarine-Navy eleven-passenger flying cruisers will be placed in operation on the Key West-Havana route and between Palm Beach and Miami and Bimini and Nassau; two other flying cruisers of the same type will be held in reserve for special chartered parties. These flying boats are the Santa Maria, Pinta, Columbus, Ponce de Leon, Balboa and Mendoza.

For the other services seven of the five-passenger HS-2 type will be placed in active operation and ten others will be held in reserve for special charters. Following are the names of six of these flying boats: Pennsylvania, New York, Miami, Florida, Virginia, New Jersey.

Three of the Aeromarine three-place flying boats will be used for special services and special charters, with two of these same types held in reserve.

It is expected that several new routes will be opened during the coming year on the Great Lakes and the Aeromarine organization and equipment will be extended accordingly.

The Aeromarine fleet will altogether comprise twenty-eight flying boats by the end of the year.

N.A.C.A. Recording Air Speed Meter *

By F. H. Norton

Langley Memorial Aeronautical Laboratory

Air speed in flight has been recorded in France and in this country almost exclusively by the Toussaint-Lepère air speed meter which consists of a recording pen operated by a spring loaded bellows. For very accurate work this instrument has a considerable amount of friction and its natural frequency is so low that it can not be used to record rapid changes in air speed, such as bumps in flight or pulsations in the wind tunnel. The British have constructed a successful recording air speed meter in combination with the Mark II accelerometer, which is of a higher frequency and with less friction than the Toussaint-Lepère instrument.

The N.A.C.A. air speed meter was designed with the idea of producing an instrument for recording the absolute air speed in flight with great accuracy and, at the same time, to have such a high natural frequency that it could be used to study the structure of rapidly changing air flow.

Diaphragm Capsule

The pressure difference to be measured is transmitted to either side of a steel diaphragm which is rigidly clamped at the edges between the halves of a circular capsule. As an unstretched diaphragm—due to a trace of concavity which can not be removed—has two points of equilibrium at zero pressure, it was found necessary to warm the diaphragm before clamping in order that it might be normally under a slight tension. It is also essential that the material of the capsule and the diaphragm have the same coefficient of expansion, otherwise the sensitivity will change with the temperature.

A hardened steel screw passes through the center of the diaphragm and rests against the polished back of the mirror staff. This staff is mounted in a highly polished conical steel socket and is held against the diaphragm screw by a light hair spring. A plane silvered mirror 4 mm. square and 0.2 mm. in thickness is cemented to the staff. The deflections of the diaphragm are thus converted into a rotary motion of the mirror with very slight friction. The natural frequency of the diaphragm and mirror is about the same as that of a telephone diaphragm—2000 vibrations per second. This frequency could be made even higher than this if it were desired to use the instrument for studying high pitch sound waves.

Optical System

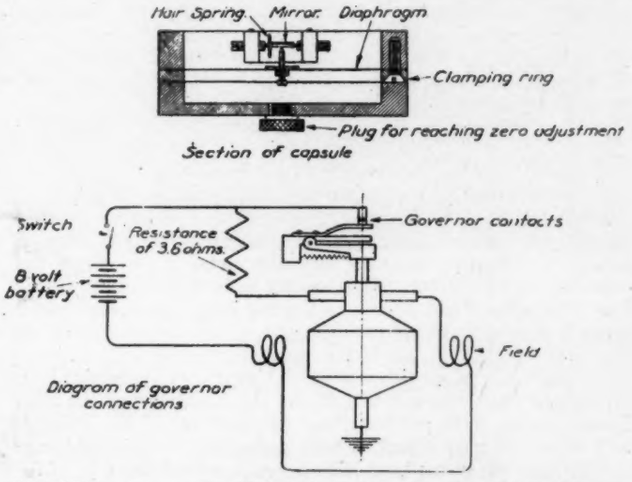
The lamp consists of a special 3.8 volt bulb made especially for this work by the General Electric Co. to give a true line source. The light from this lamp passes through a lens to the mirror from which it is reflected back through the same lens to the film, as described more in detail in N.A.C.A. Technical Note No. 22. In this instrument the lens was a simple one but better results would be obtained by using a corrected photographic objective.

The Film Drum

The film is contained in interchangable daylight loading drums revolving once in two minutes, a detailed description of which is given in N. A. C. A. Technical Note No. 22.

The Driving Motor

The film is moved by an electric motor connected to the drum by a worm drive. This motor was developed, after a considerable amount of experimental work, as the most satisfactory means of driving a drum at a relatively high speed. This motor is of the direct current, series type and is held at constant speed by means of a governor as shown in the accompanying diagram. This governor will hold the speed to within ±2 per cent of constant for considerable changes in voltage and load. The motor runs on 8 volts, normally taking 1.6 amperes and will reach its normal speed in less than one-half second after closing the switch, with a starting current of 4½ amperes.



SOME DETAILS OF THE N.A.C.A. RECORDING AIR SPEED METER

Precision of the Instrument

The width of the line traced by this instrument is rather great, 0.010, due to the poor quality of the lens. If readings are taken on one edge of the line the sharpness is sufficient to read within 1/1000, which will give a precision of 1 per cent when the deflection is only 1/10 in.

In order to determine the hysteresis of this instrument its readings were compared with those of a water column when the pressure was increased and decreased. The difference between ascending and descending curves was nowhere greater than 2 per cent of the maximum reading, and this would undoubtedly be greatly reduced under the condition of vibration which exists on the airplane. For the sake of comparison a similar run was made on a Toussaint-Lepere air speed meter with the pen resting on the paper in a normal manner. In this case the corresponding hysteresis error was 26 per cent of its maximum reading.

Uses for this Type of Instrument

This instrument has been used successfully for recording the air speed in flight and for studying the flow in the wind tunnel, but by putting in other thicknesses of diaphragm it will be possible to use it for studying a large number of aeronautic and automotive problems. For example it could be used to study the pulsations of flow in an intake or exhaust manifold or the character of the sound emitted by various types of mufflers or the sound waves from a revolving propeller. For the latter uses this instrument has the advantage over a number of laboratory instruments designed for recording sound waves, in that it is portable and can be used under conditions of considerable vibration without having its readings affected.

* N.A.C.A. Technical Note No. 64.

General Patrick Makes Long Airship Flight

Maj. Gen. Mason M. Patrick, Chief of Air Service, accompanied by several other Air Service officers, experienced an interesting trip in the Airship C-2 on October 18th from Bolling Field to Langley Field, flying as they did under unfavorable weather conditions with dense clouds close to the ground through which it was necessary to pass.

The airship left its base station, Aberdeen, Md., at 5:30 a. m., and accomplished much of the trip to Bolling Field before daybreak. The crew consisted of Lieut. Max F. Moyer and R. S. Olmsted, pilots; Maj. R. M. Jones, observer; two engineers; a radio operator and two rigging sergeants. At the commencement of the trip the clouds were very low, and landmarks could not be distinguished until a point in the vicinity of Baltimore was reached. The compass course estimated before starting was maintained throughout and brought the ship directly to Bolling Field without any deviation therefrom. During this stage of the trip a head wind of about 15 miles per hour was encountered. The landing at Bolling Field was made at 7:30 a. m., and General Patrick, Maj. Oscar Westover, Maj. J. A. Mars and Lieut. Courteney Whitney were taken aboard. Maj. R. M. Jones and one rigging sergeant here left the airship.

Flying in Fog

The C-2 took the air again at 7:50—its scheduled time for leaving—and started on the trip to Langley Field. Head winds estimated at from 15 to 20 m.p.h. were encountered. The ground was visible during the first portion of the journey and until a point approximately 20 miles north from where the crossing of the Potomac River occurs when traveling in an air line to Langley Field, after which dense fogs were encountered, rendering it impossible to see the ground when flying at an altitude of 600 ft. To avoid the possibility of striking hills or other objects, the airship ascended higher and maintained an altitude of from 800 to 1,000 ft. for the remainder of the trip. Dense clouds were rolling along the surface of the ground, and it was not until about an hour and a half of flying through the fog that the ground was visible again, except for a brief interval when the ship crossed the Potomac River. At a point in the vicinity of the Rappahannock River the fog dissipated somewhat, and thereafter the ground was visible. During the flight through the fog the wind changed to a more easterly direction and veered the ship some 8 to 10 miles off its course.

After some difficulty upon emerging from the fog, the exact position of the ship was ascertained, and the remainder of the trip was uneventful save for the loss of about 15 min. time due to one of the engines cutting out on account of an oil presure line vibrating itself loose upon the right motor and shortly thereafter when both engines cut out due to the non-functioning (float valve clogged up requiring adjustment) of the sump tank into which the main gasoline tanks of the airship drain. The practicability of carrying out minor repairs upon an airship during flight was demonstrated in these two emergencies; in the instance of the oil line Sergeant Nolan was able, after cutting out the motor involved, to crawl out opon the engine gantry and thereby reach and tighten the offending, loose, oil pressure line. The line effected was that running from the oil tank to the pump. In the instance of the gasoline feed trouble, motors involuntarily cut out for lack of gasoline supply systems.

There is a small tank of approximately five gallons capacity located in the extreme bottom of the car below the level of all three gasoline storage tanks. Gasoline flows into this tank equipped with a float check valve, which is filled by gravity from the main tanks. In the slip stream and close to the propellers upon either side of the car are located two Robinson cup type propellers which operate a pump, forcing the gasoline from the small tank above referred to up into another relatively small tank located above the level of the carburators and midway between the motors. This is the first instance on record of this simple and effective gasoline supply system, above described, clogging up. Hang gasoline pumps permanently installed and provided for just such emergencies were operated after it had been ascertained that the trouble lay in the non-fuctioning of the sump tank. In each of the two above instances when the motors cut out, the ship was found to be in almost perfect equilibrium.

At a point approaching the York River planes from Langley Field, consisting of three DH4s and one heavy bomber, met the airship, forming an escort for the remaining distance to Langley Field. The airship landed at Langley Field at 12:50 p. m.

In the afternoon, at 3:00 p. m., the airship with all passengers carried on the down trip, and in addition with Lieut. George F. Parris aboard, took off for the return trip to Bolling Field, which was accomplished without incident, the visibility being good. A wind of about 15 miles from the southeast helped to speed up the trip very materially, and the landing at Bolling Field was made at 5:15 p. m., when General Patrick, Major Westover, Major Mars and Lieutenant Whitney disembarked, and 15 min. later the ship took the air once more upon the last lap of the trip to Aberdeen, Md., taking on as passengers Lieuts. Wm. E. Connolly and Earle J. Carpenter. It was dusk when the ship reached the District Line, and the remainder of the trip was made in gradually increasing darkness. When passing over Edgewood Arsenal, the airship hangar at Aberdeen Proving Grounds, well provided with lights, was seen. Landing at Aberdeen was made at 6:50 p. m., without incident.

Trip a Great Success

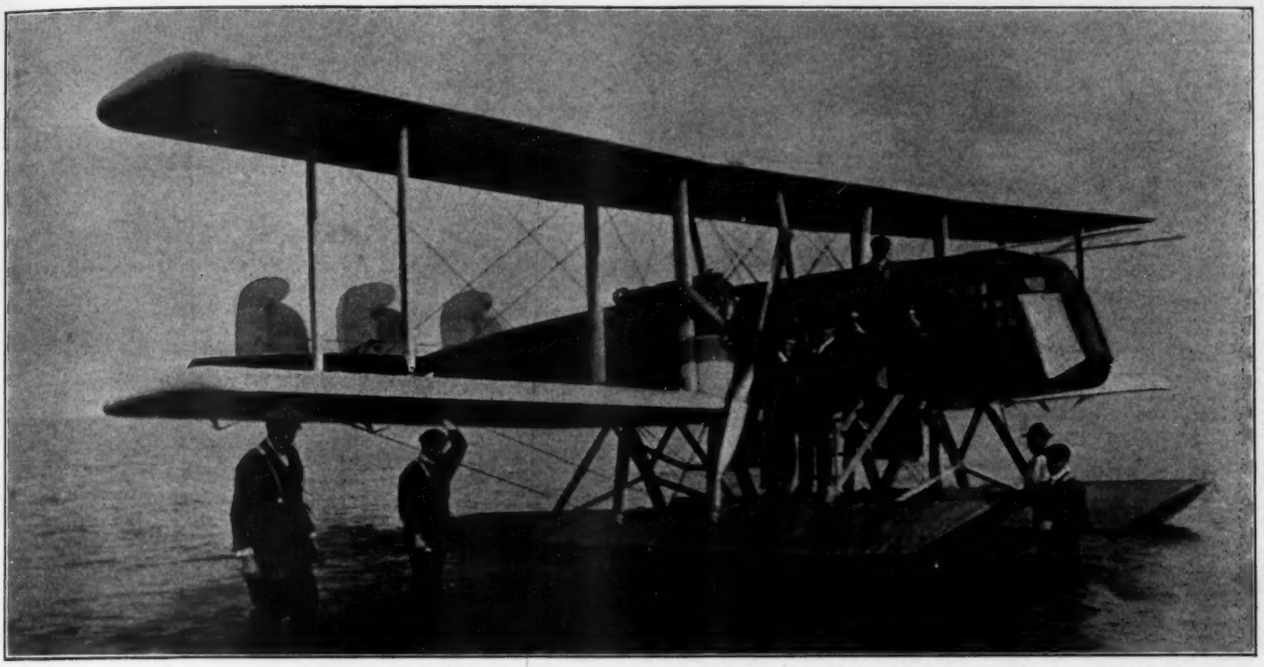
As a whole the trip was a pronounced success, and all occupants of the ship had ample opportunity to judge the characteristics of flight in a small airship under dense foggy conditions. At one time, when it was thought likely that it would be necessary to land at Langley Field in the fog, which was then rolling directly upon the ground and of sufficient density to preclude the possibility of seeing the ground from a greater altitude than 50 ft. a radio communication was obtained from Langley Field to the effect that a ceiling of 900 ft. obtained at that field. This news proved somewhat of a disappointment to the crew of the airship, as they believed it would have been very interesting to have located Langley Field at the end of a four to five hours' run in such a fog and make a successful landing. Under such conditions a captive balloon at 3,000 ft. altitude would definitely have located the field, as the upper limit of the fog was not over 2,000 ft., and such a balloon could have been seen at distances in excess of 20 miles. Another very effective method would have been to arrange a smudge pot at Langley Field, throwing up a great column of hot smoke, plainly visible under average conditions to altitudes of three and four thousand feet. The Italians used this last method during the war on the Austrian front very effectively.

The C-2 is a non-rigid airship, powered by two 150 hp. Hispano I engines. Its length is 192 ft., maximum diameter 54 ft., capacity 181,000 cu. ft., and it is capable of attaining a speed of 60 m.p.h.

With the advent of the Roma into active Army Air Service flying flights similar to the above under practically any weather conditions and for greatly extended distances will be perfectly feasible. Comfort, reliability and remarkably fast time for the longer distances will be assured. Frequent runs to the Pacific Coast from Langley Field, the home of the Roma, are perfectly practicable, and such a run as General Patrick took in the C-2 from Washington to Langley Field and return will doubtless find its magnified and improved counterpart in a not distant future run from Washington to Los Angeles and return.

While at Langley Field General Patrick and Major Westover inspected the airship Roma, which was found to be about 73 per cent erected and fast approaching completion. General Patrick evinced great interest throughout the trip in the meterological conditions prevailing and in the operation of the airship and its general performance On alighting at Bolling Field he expressed himself as well pleased with the trip.

The Dayton-Wright Model FP-2 Seaplane



THE DAYTON-WRIGHT FP-2 FOREST PATROL AND SURVEY SEAPLANE

The Dayton-Wright Co. recently completed the construction of its Model FP-2 seaplane, which, as may be seen from the description which follows, embodies some highly interesting features.

This type was developed to satisfy the requirements of forest patrol services for an airplane specially equipped for aerial photography, mapping, surveying, inspection and timber patrol in territory otherwise inaccessible and having no other landing facilities than bodies of water. Such territories are particularly often met with in Canada, and for this reason a pilot of the firm spent several months in the Dominion to gather impressions as to the kind of service such a machine would have to perform in every day operation. As a result of his recommendations, special care was given in the design of this machine to four factors, namely, (1) wide angles of vision for the occupants, (2) comprehensive appointments for the crew, (3) provisions insuring the safety of the machine under almost any eventuality, and (4) adaptation of the machine to the special conditions under which it would be called to operate.

Construction Features

The type of construction adopted for the Model FP-2 answers the purpose of making maintenance cheap and easy. The upper and lower wing panels are interchangeable, and so are many of the fittings. The wing spars are of box construction, while the interplane struts are seamless steel tubes. The wings are fabric covered. The fuselage is built of four spruce longerons and a number of veneer bulkheads, and is covered with a special three-ply consisting of a core of Balsa wood and black walnut facings.

THE DAYTON-WRIGHT FP-2, AS ORIGINALLY FITTED WITH TWO HALL-SCOTT L-6 ENGINES AND PUSHERS. ON THE RIGHT A VIEW FORWARD FROM THE CABIN

The cabin seats four persons in pairs, and thoroughly protects the occupants against the cold, and partly also against the noise of the engines. The cabin is reached from the float by means of a folding ladder and a door of liberal size, and folding doors provided in the roof act as emergency exits. Windows let in the sides and bottom of the fuselage afford excellent vision forward and directly downward. The window beside the pilot may be folded out of the way to insure increased vision, if desired. The two front seats may be arranged to swivel so as to face to the rear when the machine is afloat, and a folding table may then be placed between the four seats. The rear part of the fuselage affords a clear space of 15 x 4 x 4½ ft. which may be used for stowing baggage, camp equipment, provisions, folding canoes, etc. Folding bunks for four may also be provided if desired.

The power plant consists of two 420 hp. Liberty engines driving four bladed tractor propellers. Originally two 210 hp. Hall-Scott L-6 engines were fitted with pusher propellers, but the heavier engines have since been installed to insure a larger excess of power when flying on one engine, and also higher speed.

The twin floats are of the shape which practical experience in the Naval Air Service has shown to have excellent qualities.

Specifications

Type of machine	Twin tractor float seaplane.
Name of type No. of machine	FP-2
Purpose for which intended	Forest patrol.
Crew	4.
Span	51 ft. 5 in.
Overall length	36 ft. 10 in.
Maximum height	14 ft.
Total wing area	668 sq. ft.
Engines, type and hp.	2—420 hp. Liberty XII.
Weight empty	5726 lb.
Weight loaded	7588 lb.
Performance	
High speed	120 m.p.h. (estimated).
Low speed	63 m.p.h. (actual).
Climb in 10 min.	5000 ft. (actual).
Service ceiling	18,000 ft. (estimated).
Take-off from water	22 sec. (actual).
Range	325 miles at 90 m.p.h.
Control Surfaces	
Ailerons	88 sq. ft.
Tail plane	53.8 sq. ft.
Elevators	29.0 sq. ft.
Fins	20.8 sq. ft.
Rudders	28.7 sq. ft.

Wing section, USA-27. Incidence, 2 deg. Dihedral, 2 deg. Gap, 92½ in.

Civil Aeronautics Bill

Congressman Hicks Introduces Wadsworth Bill in House

Congressman F. C. Hicks on Nov. 17 introduced in the House of Representatives the bill providing for a Bureau of Civil Aeronautics which had been sponsored by Senator Wadsworth in the Senate. In his remarks Mr. Hicks said:

"So important is the development of civil aviation considered by most of the countries abroad that those governments give to private concerns their full cooperation and assistance.

"At the present time it is possible to travel by air between all the principal cities of Europe at a cost which makes aviation a serious competitor of the railroads. Between London and Paris for instance, there are three British and two French air lines, operating daily services at a cost of approximately $18 per passenger, and so safe has this method of travel become that I understand the insurance rate by air is less than by surface craft.

"America, the inventor of the airplane, has been backward in pushing this means of transportation, yet we possess the genius to invent, the talent to produce and the skill to operate. Several causes may be noted for this lack of interest. One is that until recently our investment capital has found other channels of profit, and another very serious objection to engaging in aviation as a commercial enterprise has been the lack of governmental supervision over aircraft and the pilots who operate them. Various bills, including several of my own, have been introduced to cure this last defect, but Congress has not taken action.

"This bill has been prepared after consultation with aviation authorities and those interested in developing civil aeronautical activities, and is based largely upon the thorough discussion of the subject at the recent meeting of the American Bar Association in Cincinnati.

"As will be seen by reading the bill, which is being sponsored in the Senate by Senator Wadsworth, its primary purpose is to control civil aerial navigation, in order to conserve life and property, and at the same time, to guide, direct and stimulate the growth of this new addition to our transportation facilities. This will be accomplished by means of an adequate inspection and licensing of pilots and planes, laying out of air routes and the establishment of airdromes, and the dissemination of weather reports for the benefit of pilots.

"The Bill is approved by practically all of the organizations throughout the United States, representing the operating, engineering, constructing and commercial elements in aviation. It is imperative that legislation on this important subject be secured without further delay.

"The recent railroad crisis makes urgent the immediate consideration by Congress of all means of emergency transportation. I am informed that twelve hundred civilian aircraft are immediately available for the transportation of passengers, particularly those officials and business executives who are required to move quickly from point to point in an effort to keep open the channels of commerce. With the surplus equipment in the Army and Navy Air Services it would make possible expansion of the Air Mail from the transcontinental service now carried on into a nation-wide system sufficient to care for urgent correspondence, official and private. The recent crisis has brought into high relief the demand which has been placed before Congress many times in the last three years for specific legislation.

"These supplementary transportation resources are available in spite of the fact the United States has ignored the general demand for the regulation, stimulation and encouragement of commercial aviation as a valuable auxiliary to rail and water service.

"President Harding in a message last spring called the attention of Congress to the need of legislation on this very vital subject.

"It seems to me undeniable that commercial aviation is desirable for the economic and social benefits it confers and absolutely indespensable as a productive reserve for purposes of national security. Therefore, I urge immediate legislation through the passage of this bill."

The Drag of Zeppelin Airships

N.A.C.A. Report No. 117

Report No. 117 is a discussion of the results of tests with Zeppelin airships, in which the propellers were stopped as quickly as possible while the airship was in full flight. In this paper the author refers to the theory involved in these tests and to one scientifically interesting fact which can be derived from them and which has not yet been noted.

The chief general question concerning these tests is, of course: Does the negative acceleration of an airship with stopped propellers supply proper data for determining the drag of the airship when in uniform flight? This can not absolutely be answered in the affirmative, the two phenomena not being identical in principle. It is believed, however, that in this particular case the agreement is sufficient and that the data obtained from the test are the true or, at least, the approximate quantities wanted.

A copy of Report No. 117 may be obtained upon request from the National Advisory Committee for Aeronautics.

Legal Aspect of Federal Air Legislation*

Theory of Necessity of Constitutional Amendment Fallacious

By W. Jefferson Davis

Major, Air Service, Reserve

The achievements of American Aces in command of battle planes on the Western Front have been followed, and are to be followed, by the achievements of the pen of distinguished members of the Bar, who are to write the charter for Civil Aviation, and are to guide and direct our Federal Government, and the individual States on the question of sovereignty which they should and will exert over the air.

An extremely pessimistic view is taken by those who advocate the passage of a constitutional amendment. The theory of the necessity of such an amendment is founded solely upon the premise that the air is owned absolutely by the surface owner, and that all flight over such air space constitutes trespass. They go even further, and say that there can be no development of aerial transportation without a constitutional amendment under which the people of the states would give up their property rights in space to some extent, and allow an easement of passage. This view of space ownership comes from too liberal and narrow interpretation of the common law maxim.

"Cujus est solum ejus est usque ad coelum."

(Who owns the ground owns the sky above it.)

A careful examination of the authorities will show, however, that this is not law, but is merely a theory which has come down to us from mediaeval days, because there has never until recently been any occasion to distinguish between applications which might be drawn from it.

It is a maxim relating to tenancy, and not to sovereign rights. It is also a maxim relating to rules of conveyance and not to sovereignty.

Aviation is concerned only with a use of the atmosphere for navigation purposes, the right of navigation being only a right to use and not constituting a title in fee to the area affected. It is not a constitutional objection to the exercise by Congress of the right to regulate air navigation that the property or rights of individuals may be incidentally affected thereby.

The German Civil Code qualifies the common law by adding that the owner can not prohibit interferences which take place at such height or depth that he has no interest in their exclusion.

What possible interest has the owner of land in the passage through the air space above his property of an airplane at an elevation of from, say, 8,000 to 10,000 ft.? In what way can he say that he is damaged in such passage?

I think it can be said that only the rights in space which the courts have seen fit to protect have been the rights in space immediately adjacent to and connected with the surface. There are no authorities to the effect that it is a wrong against a landowner to interfere with the space over his land, when the passage is at such a height that the use of the surface is not affected in the slightest degree.

Subject to Passage by Aircraft

The codes of all countries treat the landowner's property in the space above his land as subject to a right of passage by aircraft.

None of these codes require condemnation of an aerial right of way, and none provide that the mere flight through the space above shall constitute a trespass. To retain such a doctrine (usque ad coelum), in the opinion of the British Aerial Transport Committee (Report of 1918) would be fatal to civil aeronautics.

In a report on the French Government Air Bill of 1913, M. Thierry, who presented the bill to the French Legislature, said that the commission which framed it, advised that the French law did not give the owner of the soil property in the space above, not susceptible of private appropriation. Statutes similar to those enacted by Great Britain, France and Germany, also exist in the other countries commonly classed as the great powers.

America, from whose creative genius the airplane sprang, is asked to ignore the natural evolution of the law of the airplane, as developed by all other countries, and to turn its attention to retrogressive legislation, as a result of which the future of civil aviation would be hopelessly handicapped and retarded for years to come.

In September, 1919, at Boston, the Conference of Bar Association Delegates, an organization affiliated with this Association, adopted a resolution to the effect that it was the sense of the Conference that Aeronautics should properly lie within the Admiralty jurisdiction of the United States. A committee was appointed, and two reports were submitted, in both of which Federal aviation legislation under the Admiralty power was strongly urged.

The National Advisory Committee for Aeronautics recommends that federal legislation should precede any action by the states, and in its last report recommends such federal legislation. Various bills are now pending in Congress, in which such portions of the air as are navigable by aircraft are declared to be within the Admiralty jurisdiction of the Federal courts. Two of these bills, the Hicks bill and the Kahn bill, have been approved by the National Advisory Committee for Aeronautics.

"Removing Sources of Friction"

The Washington Conference on Disarmament has for its purpose a desire on the part of the President to "find the remaining sources of friction in the world, and remove them." It is primarily an evidence of America's awakening to the responsibility of our world leadership. Let us now find the sources of friction between the various recommendations, in order that we may have a concrete solution to the problem in regard to the jurisdiction of the air.

We have learned to make constitutions work, and see no reason for abandoning them. Our instinct is to let practical measures, meeting present emergencies, evolve into unwritten laws of general application.

This is the spirit of the Washington Conference. This is the idea which should dominate Americans at this time, as we emerge from our isolation into our position of world supremacy.

To keep pace with what other nations have already done in a field where the first trails were blazed by American genius, we must not lag behind when laws are necessary for the development of a new industry, a new avenue of transportation; we must not put obstacles in the way, but we must trust to American minds to find a practical solution of present needs, and not let mere theories defeat our progress.

The late Walter M. Page, Ambassador at the Court of St. James, wrote President Wilson a strikingly prophetic letter in 1913:

> "We are in the international game—not in its old world intrigues and burdens and sorrows and melancholy, but in the inevitable way to leadership, and to cheerful mastery in the future; and everybody knows it but us."

Our Leadership in the Air

How will we assume our new place of leadership in the air, leadership in a field which we were first to enter, and yet now are lagging behind every other nation? We can never assume leadership in this field unless we are prepared to accept and profit by the experience of other nations, as a result of the recent development of the airplane, and of the law of the air.

* Parts of an address delivered before the American Bar Association at Cincinnati, Ohio, Sept. 2, 1921.

There is a feeling in the minds of all thinking people at this time that the airplane and submarine have brought the doom of the capital ship. We are not concerned so much with legislation over the air during time of war, but the best preparation for the use of the airplane as a medium of defense in the event of war is the development of civil aviation at this time, as a preliminary to the use of the airplane as a medium of defense.

The airplane as a medium of inter-communication and transportation however, can not be used successfully at this time unless there is immediate uniform legislation on the subject, and civil aviation is freed immediately from the encroachments of states and muncipalities in a field which is essentially one for Federal control.

Aviation National in Character

The subject of air navigation is national in its character to such an extent as to require uniformity of regulation effecting all states alike, and in such a case the power of Congress has been held by our Supreme Court to be exclusive when state enactments would clearly be repugnant to the exercise of authority by the United States Government.

Professor Bogert in a very excellent brief on "Problems in Aviation Law," says:

"The best step for the American Bar Association is to recommend to the Senate the ratification of the International Air Convention."

I heartily concur in that recommendation, and might also say that it is in line with an opinion on this subject, which I have had the honor to render the Air Service.

Primarily, of course, we should become signatory to the International Air Convention, and that will be the basis of laws on the subject of aviation. The Convention should be ratified immediately, and that, in my judgment, should be our recommendation to Congress.

Writers on International Law almost without exception now agree that sovereignty over airspace exists.

Wilson, Aerial Jurisdiction, 5 Am. Pol. Sci. R. 171-9 (1911):

"It would seem that physical safety, military necessity and sanitary regulations justify the claim that a state has jurisdiction in aerial space above its territory."

An International Air Navigation Convention has been signed by all the allied and associated powers (the United States signing with reservations, which cover any constitutional limitations which might arise). One of the main guiding principles of this convention is recognition of the principle of the full and absolute sovereignty of each State over the air above its territories and territorial waters, and the right of each State to impose its jurisdiction over the air above its territory and territorial waters.

The basic principle of the International Air Navigation Convention, that of sovereignty in each nation over the air space above its territory, is surely acceptable to the United States.

Illustrating the use of the air for navigation are those cases pertaining to the use of the air by migratory birds. Regulations concerning migratory birds do not fall within the power to regulate commerce, nor within any of the other powers of Congress. The first Migratory Bird Act was held unconstitutional. (U. S. vs. Chauver, 221 Fed. 228.) Subsequently thereto a Migratory Bird Treaty was entered into with Great Britain, and a second act passed in conformity thereto. The legislation has since been upheld upon the ground that it is within the power of Congress to carry into effect the moral obligation assumed by the nation in the treaty by appropriate legislation. (U. S. vs. Selkirk, 258 Fed. 775.)

Treaty Power of the Government

The Federal government has exclusive power to make treaties with foreign governments, and the case of State vs. Holland, 40 Sup. Ct. R. 382 (1920), decided that where the execution of such a treaty requires federal legislation, such legislation will be upheld, even though it interfered with the internal affairs of a state, not otherwise subject to national control.

"In this case a federal law for the protection of migratory birds, enacted in fulfillment of a treaty with Great Britain, was sustained, though it interfered with state control of birds, and although a previous act of the same purport, but not enacted under a treaty, had been held unconstitutional on the ground that it interfered with the state's reserved rights." (Bogert, Problems in Aviation Law.)

If there be any doubt therefore as to whether the Federal government has jurisdiction over the airspace, any doubt would be instantly dissipated by the ratification of the International Air Navigation Convention, and the passage of legislation pursuant to the terms of the Treaty.

Annual Meeting, Ae. C. A.

The twelfth annual meeting of the Aero Club of America was held on Monday evening, Nov. 14, 1921. The following governors were elected under class A, term expiring 1924. James A. Blair, Jr., George H. Houston, Richard F. Hoyt, Herbert Fish, S. R. Bertron and Lorillard Spencer. The following governors were elected for one year under class B. Godfrey L. Cabot, Howard E. Coffin, Rear Admiral B. A. Fiske, Charles J. Biddle, Albert Bond Lambert, George M. Myers, John Larkin, Benedict Crowell, Gould Dietz. The officers to serve for the coming year will be elected at the next meeting of the Governing Board.

Marshall Ferdinand Foch, Admiral Sir David Beatty, General Armando Diaz were elected Honorary Members.

Reports of the various committees were read including that of the Contest Committee which announced the various meets that had been sanctioned throughout the year and strongly advocated aviation competition which has done more than any other one thing to develop real progress in the building of new types of machines and increasing the skill of pilots.

A very interesting report from Godfrey L. Cabot, delegate of the Aero Club of America to the F.A.I. conference in Madrid, was read in which he stated the Congress was opened by the King and Queen of Spain with impressive ceremonies. The Aero Clubs of China and Chile were elected to membership, and Austria was reinstated as a member of the F.A.I. World records for spherical balloons of different sizes were provided for to increase interest in free ballooning.

The rules were modified in the case of altitude records for airplanes permitting them to land at some other place than the point of departure provided the instruments were returned intact and duly sealed.

A form of Triptyque was adopted which will do away with many of the difficulties now encountered in passing across the border from one country to another and complying with the custom regulations. By registering airplanes with this Club it becomes responsible for the duties and vouches for the return of airplanes crossing the frontier. This is similar to the arrangement made by the automobile clubs of Europe to enable their members to cross the frontier without being delayed by tedious formalities. The request by America to have seaplane records classified separately was adopted, and referred to the Technical Committee to determine the various details involved. The committee will meet in January to fix the date for the next meeting in 1922.

A vote of thanks was tendered to the Foreign Service Committee for their good work in representing the Aero Club of America at the various meets and conferences held in Europe during the past year including the Gordon Bennett Aviation and Balloon Races and the Deutsch de la Meurthe speed prize contest.

Resolutions were adopted commending the work and the recent achievements of the Army and Navy in demonstrating the efficiency of the Airplane as an agency of the National Defense.

"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

Every week, AVIATION AND AIRCRAFT JOURNAL prints the biographical sketch of men who are prominent in American Aeronautics. These sketches will be published later in pamphlet form. As so many of the officers change their stations often, it is believed that a semi-annual issue will be necessary. In compilations of this character many errors and omissions occur. It will be appreciated if corrections are sent to "Who's Who" Editor.

Zachary Lansdowne

LANSDOWNE, ZACHARY, Lt. Comdr., U. S. N.; born, Greenville, Ohio, Dec. 1, 1888; son of James Moreton Lansdowne and Elizabeth (Knox) Lansdowne; married, Ellen MacKinnon, May 27, 1913.

Educated: U. S. Naval Academy, 1909.

Professional: Two years sea service as midshipman on battleship U.S.S. Virginia; four years sea service, torpedo boat destroyer, U.S.S. McCall.

War Service: Ordered to U.S.N.A.S., Pensacola, Dec. 1916; ordered to England, Aug. 1917; service at British Air Stations during war; R.N.A.S. Cranwell, R.N.A.S. Polgate, R.N.A.S. Pulham, R.N.A.S. Howden, until March 1918; March 1918 to Sept. 1918, duty Office of Naval Operations, (Aviation) Navy Department Washington, D. C.; ordered to France and commanded U.S.N.A.S., Guipavas, France; duty Paris Headquarters, March to May 1919 following Armistice; made flight fram East Fortune, Scotland to Mineola, L. I., U. S. A. in July 1919 on airship R-34; First westward and first transatlantic flight.

War Honors: Navy Cross (U. S.); Air Force Cross (British).

Member: New York Yacht Club; Army and Navy Club (Wash.).

Present Occupation: Bureau of Aeronautics, Navy Department, Washington, D. C.

Address: Navy Department, Washington, D. C.; home, Greenville, Ohio.

Archibald Johnston

JOHNSTON, ARCHIBALD, Commercial Aviator; born, Pittsburgh, Pa., Dec. 29, 1891; son of Charles Marshall Johnston and Sara A. (Murphy) Johnston; married, Margaret Watson Richard, March 9, 1918.

Educated: Public schools of Pittsburgh, 1899-1905; Shadyside Academy, 1905-1910; A.B. 1914, Cornell University.

Professional: 1919-1920, General Manager, Johnston Aviation Co.; 1921, Sales Manager and Secretary, Aero Import Corp.

Aeronautical Activities: 1916-1917, Lafayette Escadrille, France; Dec. 1917, commissioned, Signal Corps, Regular Army U. S. Aviation Section; Officer in Charge, Combat and Aerial Gunnery School, Gerstner Field; 1918, Chief Instructor and Chief of Control Board, Carlstrom and Dorr Fields; 1918-1919, Wilbur Wright Field, Compiler and Author of U. S. Air Service Textbooks, Pilot's Gunnery and Combat Training; 1919-1920, Johnston Aviation Co., Pittsburgh, Pa.

Flying Rating: Pilote d'Avion, French Army, Nov. 1916; Pilot Aviator, Aero Club de France, Jan. 1917; Reserve Military Aviator, Dec. 1917; Airplane Pilot, 1920.

War Service: Section 3, American Ambulance Field Service, Lafayette Flying Corps, 1916-1917; U. S. Air Service, 1917-1919.

War Honors: Croix de Guerre; three citations.

Member: University Club of Pittsburgh; Aero Club of France; Aero Club of America; American Legion; French War Veterans Association.

Present Occupation: Sales Manager and Secretary, Aero Import Corp.

Address: 1819 Broadway; home, 138 West 11th St., New York City.

E. Garnsey Brownell

BROWNELL, E. GARNSEY, Physician; born, Clifton Park, N. Y., June 1, 1876; son of German Brownell and Delia (Lockwood) Brownell.

Educated: Ballston Spa High School; A.B. 1900, Union College; M.D. 1908, Columbia University.

Professional: Physician; Alumnus, Roosevelt Hospital; connected with Roosevelt Hospital, Bellevue, and Cornell Medical College.

Aeronautical Activities: Surgeon to the First Reserve Squadron, the first and only reserve squadron organized and the first to go overseas; later, Senior Medical Officer, Air Service, A. E. F.

War Service: Enlisted, May 1917, Lt., M.C. A.S.; discharged, Sept. 1919, Lt. Col., M.C.A.S.

Member: Aero Club of America; Army and Navy Club; Columbia University Club.

Present Occupation: Physician.

Address: 132 East 60th St., New York City.

Mason Mathews Patrick

PATRICK, MASON MATHEWS, Chief of Air Service; born, Lewisburg, W. Va., Dec. 13, 1863; son of Alfred Spicer Patrick, M. D. and Virginia (Mathews) Patrick; married, Grace W. Cooley, Nov. 11, 1902.

Educated: Various public and private schools; 1886, U. S. Military Academy.

Professional: U. S. Army Engineer Corps, Commandant, Engineers' School, Washington Barracks; Chief Engineer of the Army of Cuban Pacification, 1906-1908; 1921, Commanding Officer, Engineers' School, Camp Humphreys, Va.

Aeronautical Activities: May 1918-July 1919, Chief of Air Service, A. E. F.; A. E. F. Air Service, comprised 78,000 men, 6364 airplanes, 300 balloons, 802 hangars, 32,000 acres of leased lands: October 5, 1921, Chief of Air Service, Washington, D. C.

War Service: U. S. Army.

War Honors: Awarded D.S.M.; Comdr., Legion of Honor; Comdr., Order St. Maurice and Lazarus; Knight Comdr., Order of the British Empire; Comdr., Crown of Belgium.

Member: Army and Navy Club (Wash.).

Present Occupation: Chief of Air Service.

Address: Room 2052, Munitions Bldg.; home, 2015 Kalorama Road, N. W., Washington, D. C.

George Hamilton Eichelberger

EICHELBERGER, GEORGE HAMILTON, Attorney at Law; born, Urbana, Ohio, Jan. 24, 1877; son of George Maley Eichelberger and Emma (Ring) Eichelberger; married, Frances Dodge, Aug. 11, 1908.

Educated: Urbana High School; Urbana University; Ohio Wesleyan University.

Professional: Attorney at Law; practiced law in Cleveland, Ohio since 1901.

Aeronautical Activities: Captain, Air Service, Nov. 1917; assigned to duty with Signal Offices. Port of Embarkation, N. Y.; placed in charge of office; given charge of Air Radio Supply Depot and Air Photographic Supply Depot, N. Y.; promoted to Major, Air Service, Aug. 1918, and placed in command of Aviation General Supply Depot at Little Rock, Ark.

Present Occupation: Attorney at Law.

Address: 905 Kirby Bldg.; home, 2732 East Overlook Road, Cleveland, Ohio.

William Edward Boeing

BOEING, WILLIAM EDWARD, Aircraft Manufacturer; born, Detroit, Mich., Oct. 1, 1881; son of William Boeing and Marie M. (Ortman) Boeing; married, Bertha Potter Paschall, Sept. 27, 1921.

Educated: Public and private schools; two years at Yale University.

Professional: Timber business; 1915 to date, aircraft manufacturing.

Aeronautical Activities: Flying instruction under Glenn L. Martin at Los Angeles, Calif.

War Service: Navy; Lt. (j.g.) U.S.N.R.F. Aviation; (inactive duty on account of airplane manufacturing).

Member: Aero Club of America; Aero Club of Northwest.

Present Occupation: President, Boeing Airplane Co.

Address: 1100 Hoge Bldg., Seattle, Wash.

Kenneth G. Fraser

FRASER, KENNETH G., 1st Lieut., Air Service; born, LaSalle, Ill., July 19, 1888; son of Dr. W. H. Fraser and Lydia M. Fraser.

Educated: Public and high schools of LaSalle, Ill.; Russ High School of San Diego, Calif.; University of Illinois.

Professional: U. S. Reclamation Service; Antelope Valley Irrigation Co.

Aeronautical Activities: School of Military Aeronautics, Austin, Tex.; M.S.E., Rockwell Field; flying training. Call Field; flying instructor, Taylor Field; Engineering Division, McCook Field.

Flying Rating: Reserve Military Aviator, March 1, 1918; Airplane Pilot, July 1, 1920.

War Service: July 5, 1917 to date.

Member: Engineers' Club, Dayton, Ohio.

Present Occupation: 1st Lieut., Air Service.

Address: McCook Field; home, 535 Y.M.C.A., Dayton, Ohio.

Frank T. Coffyn

COFFYN, FRANK T., Real Estate; born, Charleston, S. C., Oct. 24, 1878; son of George M. Coffin and Julia (Haskell) Coffin; married, Pauline Louise Neff, April 3, 1915.

Educated: Force School and Central High School, Washington, D. C.

Professional: First position with American Security & Trust Co., Washington, D. C., 1899; brokerage business, New York City, 1900-1901; manufacturing, Gordon Battery Co., Treasurer, 1902-1903; manufacturing to 1910.

Aeronautical Activities: Learned to fly at Dayton, Ohio, May 1910; taught by Orville Wright: flew for Wright Co. two years; operated their school of instruction at Augusta, Ga., winter 1911; flew for self 1912 after leaving Wright Co.; took first successful moving pictures from airplane over New York Harbor in Feb. 1912; became test pilot and instructor for Burgess Co., Marblehead, Mass. in Jan. 1913 and remained with them until early 1914, then became their New York representative, 1915-1916.

Flying Rating: Aero Club of America license No. 26.

War Service: Entered Air Service, June 1917; stationed, Mineola, L. I.; Officer in Charge of Flying, Rich Field, Jan. to July 1918; Commanding Officer, Henry J. Damm Field, Aug. to Dec. 1918.

Present Occupation: Real Estate.

Address: 1 West 67th St.; home, 20 West 56th St., New York City.

Raymond Edward Vaughan

VAUGHAN, RAYMOND EDWARD, Captain, Air Service; born, Jasper, Minn., Jan. 20, 1893; son of Lorenzo M. Vaughan and Anna (York) Vaughan; married, Marguerite E. Martinette, Aug. 11, 1918.

Educated: Public and high schools of Jasper, Minn.

Professional: Publisher of Iowa weekly newspaper 1909 to 1912; U. S. Navy from 1913 to 1917, specializing in radio telegraphy and telephony at Arlington.

Aeronautical Activities: U. S. Air Service since July 1917; Instructor at School for Aerial Observers, Fort Sill, Okla., Sept. 1917 to Jan. 1918; overseas, Jan. to Aug. 1918; engaged in radio engineering and research in England and France, specializing in radio navigation for night bombardment airplanes; returned to U. S. in Aug. 1918 to open schools for training radio navigators and operators for night bombardment airplanes, also to help place radio navigating apparatus into production; Langley Field, Dec. 1918 to March 1919; Engineering Division, Mc Cook Field, April 1919 to date.

Flying Rating: Airplane Observer, Nov. 7, 1917.

War Service: U. S. Navy, April to July 1917; Air Service, July 1917 to date.

Present Occupation: Captain, Air Service; Chief, Radio Branch, Engineering Division, Mc Cook Field.

Address: McCook Field, Dayton, Ohio.

Franklin Livingston Hunt

HUNT, FRANKLIN LIVINGSTON, Physicist; born, Manchester, N. H., Sept. 3, 1883; son of Charles F. Hunt and Flora N. (Webber) Hunt.

Educated: Public schools of Waltham, Mass.; S.B. 1909, Ph.D. 1919, Mass. Inst. of Tech.; A.M. 1913, Harvard University; graduate student, University of Berlin, 1913-1914, University of Paris, 1919-1920, University of Cambridge, 1920.

Professional: Instructor in Physics, M.I.T., 1911-1913, 1915-1917; Physicist, Bureau of Standards, 1917; representative, Bureau of Standards in Europe, 1919-1920; Chief, Aeronautic Instruments Section, Bureau of Standards, 1920 to date.

Aeronautical Activities: Interested during the past four years in the investigation and development of aircraft instruments.

Member: American Physical Society; Philosophical Society of Washington; Cosmos Club (Wash.).

Present Occupation: Chief, Aeronautic Instruments Section, Bureau of Standards.

Address: Bureau of Standards, Washington, D. C.; home, 19 Howard St., Waltham, Mass.

George Francis Lyon

LYON, GEORGE FRANCIS; born, Newark, N. J., April 21, 1876; son of Frank G. Lyon and Christine A. (McGowan) Lyon.

Educated: Public school, New York City; Walkell Academy, Middletown, N. Y.

Professional: Lt. and Lt. Col., Philippine Constabulary, 1902-1918; served as Adjutant General five years, Quartermaster one year; participated in actions in Philippines.

Aeronautical Activities: Third Assistant to Director, Aircraft Production, Chief, Collection Division, Information Army A.S., Secretary, Advisory Board in charge presentation A.S. estimates before committee of military affairs, 1918, 1919; resigned as Major, Air Service, Nov. 1919; served as Major, American Red Cross, Siberia, as business executive; Commissioner to Serbia, American Red Cross, 1920.

War Service: World War as above; 1898, Astor Battery in Philippines.

War Honors: Order of Redeemer (Greece); Commander Order Danilo I (Montenegro); St. Sava 3rd class, Serbia, 1920.

Member: Army and Navy Club, Manila, P. I.

Address: 401 N. Park Ave., River Forest, Ill.; home, National Arts Club, New York City (Temporary, Nov. 3, 1921).

Earl Wilbert Leatherman

LEATHERMAN, EARL WILBERT, Commercial Aviation; born, Guilford Township, Medina County, Ohio, Oct. 29, 1891; son of Martin Leatherman and Barbara (East) Leatherman.

Educated: 1916, Bachelor of Mechanical Engineering, Ohio State University.

Professional: Draftsman with The Burger Iron Co. of Akron, 1913; Aeronautical Department, Goodyear Tire & Rubber Co., July 1916 to date (Oct. 1921).

Aeronautical Activities: Training flights in free balloons and airships during 1918 at the Goodyear Akron Air Station; Kite Balloon test flights for the purpose of testing out new designs developed by the Goodyear Aeronautical Department.

Flying Rating: Free Balloon Pilot, license No. 811.

Member: Society of Automotive Engineers; Akron University Club.

Present Occupation: In charge of Envelope Design, Aeronautical Department, Goodyear Tire & Rubber Co.

Address: Goodyear Tire & Rubber Co.; home, 43 Ruth Ave., Akron, Ohio.

Ernest J. Fuller

FULLER, ERNEST J., Lieut., U.S.N.R.F.; born, Brooklyn, N. Y., Aug. 8, 1885; son of James Mann Fuller and Agnes (Johnson) Fuller; married, Inez H. Sanborn, Sept. 21, 1918.

Educated: 1903, Polytechnic Preparatory School, Brooklyn, N. Y.; 1908, Union College.

Professional: 1908-1914, The American News Co. as executive; 1914-1917, manufacturing business.

Aeronautical Activities: Ground School Course, Naval Aviation Detachment, M.I.T., 1917; preliminary and final training as Naval Aviator, 1918-1921; stationed at Bay Shore, L. I., Brunswick, Ga., Miami, Fla., Navy Department, Washington, D. C., U.S.S. Langley, Norfolk, Va.

Flying Rating: Naval Aviator No. 2689, Sept. 1919.

War Service: As above.

Present Occupation: U. S. Navy; duty in C. F. O., U. S. S. Langley.

Address: Navy Yard, Norfolk, Va.; home, Warwick, N. Y.

George Howell Shields, Jr.

SHIELDS, GEORGE HOWELL, Jr., Oil Business; born, Hannibal, Mo., March 27, 1869; son of George H. Shields, Sr. and Mary Harrison (Leighton) Shields; married, Florence M. Streett, June 5, 1907.

Educated: Smith Academy, St. Louis, Mo.; A. B. 1891, A.M. 1893, Princeton University; LL.B. 1893, LL.M. 1893, George Washington University.

Professional: Practiced law, 1893 to 1898; U. S. Army, 1898 to 1909; Jobber and Specialist in Lubricating Oils, 1909 to date.

Aeronautical Activities: Assistant Executive, D.M.A., Washington, D. C., 1918; Army Balloon Schools, Omaha, Nebr. and Arcadia, Calif., 1918.

War Service: 2nd Lieutenant, 1st Lieutenant and Captain, U. S. Infantry, 1898-1909; Major, A.G.O. and Lt. Col., Air Service, 1918.

Member: Army and Navy Club (Wash.).

Present Occupation: Vice President, J. D. Streett & Co., Inc.

Address: 4055 Park Ave.; home, 6409 Wydown Blvd., St. Louis, Mo.

Clarence Dean Hanscom

HANSCOM, CLARENCE DEAN, Aeronautical Engineer; born, Chelsea, Mass., Dec. 29, 1894; son of Isaiah C. Hanscom and Maud Hallet (Savage) Hanscom.

Educated: High school, Dorchester, Mass.; A.B. 1917, Harvard University.

Aeronautical Activities: Instructor in Aeronautics, U. S. Naval Airplane Inspectors' School, Mass. Inst. of Tech., Oct. 1917 to Oct. 1918; Instructor in Aeronautics, Aeronautical Engineering School, Mass. Inst. of Tech., Oct. 1918 to Feb. 1919; Aeronautical Engineer, Air Service, Oct. 1918 to April 1920; Assistant Chief Engineer, Aerodynamical Laboratory, Mass. Inst. of Tech., Jan. 1919 to April 1920; Chief Engineer, Glenn L. Martin Co., April 1920 to date.

War Service: Seaman, 2nd class, Naval Reserve (Aviation), 1917-1920.

Member: Society of Automotive Engineers.

Present Occupation: Chief Engineer, Glenn L. Martin Co.

Address: 14403 Westropp Ave., Cleveland, Ohio.

Arthur Dexter Butterfield

BUTTERFIELD, ARTHUR DEXTER, Educational Director; born, Dunstable, Mass., Oct. 13, 1870; son of Dexter Butterfield and Georgianna (Kenney) Butterfield; married, Fannie Day, Oct. 14, 1898 (died, Jan. 17, 1916); Orpha Lee Howe, June 18, 1921.

Educated: Dunstable, Mass. public schools; Westford Academy, Westford, Mass.; B.S. 1893, M.S. 1898, Worcester Polytechnic Institute; A.M. 1904, Columbia University.

Professional: U. S. lighthouse service, 1893-1894; Instructor in Civil Engineering, Worcester Polytechnic Institute, 1894-1898; Instructor, Asst. Prof. and Prof. of Mathematics and Mechanics, University of Vermont, 1898-1908; Asst. Prof. and Prof. of Mathematics and Geodesy, Worcester Polytechnic Institute, 1908-1920.

War Service: Capt., U. S. Army Air Service, Oct. 14, 1917; Major, Sept. 16, 1918; Lt. Col., Feb. 21, 1919; discharged, Sept. 16, 1919.

War Honors: Chevalier Legion of Honor, April 18, 1919; Order St. Michael and St. George.

Books: History of the Figure of the Earth from Meridian Arc Measurements.

Present Occupation: Educational Director, Norton Co., Worcester, Mass.

Address: 6 New Bond St.; home, 10 Schussler Road, Worcester, Mass.

George William Haskins

HASKINS, GEORGE WILLIAM, Aeronautical Engineer; born, Waterville, Ohio, March 11, 1892; son of William Liberty Haskins and Martha Fearnside Haskins.

Educated: High school, Waterville, Ohio; Valparaiso University; B.S. in M.E. 1916, Purdue University; Aeronautical Engineering, Boston Technology Institute, 1919.

Professional: Special apprentice, New York Central Lines before 1916; Engineering Salesmanship after graduation till enlistment in the Air Service.

Aeronautical Activities: Ground School. Columbus, Ohio, Dec. 1917; primary flying training at Wichita Falls, Tex. and Rockwell Field, Oct. 1918; Engineering Research at McCook Field in materials, aerodynamics, and design to date.

Flying Rating: Reserve Military Aviator.

War Service: Army.

Member: American Society of Mechanical Engineers.

Present Occupation: Aeronautical Engineering, McCook Field.

Address: McCook Field; home, 23 W. First St., Dayton, Ohio.

Claremont Leroy Egtvedt

EGTVEDT, CLAREMONT LEROY, Aeronautical Engineer; born, Stoughton, Wis., Oct. 18, 1892; son of Sever P. Egtvedt and Mary (Rublee) Egtvedt.

Educated: High school; 1917, University of Washington, Colleges of Civil and Mechanical Engineering.

Professional: Concrete building construction, 1914; 1915 and 1916, design and construction of boilers, shiptanks and structural steel.

Aeronautical Activities: Airplane design, June 1917; Assistant Engineer, Boeing Airplane Co., Aug. 1917; Chief Engineer, Boeing Airplane Co., Dec. 1918.

Member: Aero Club of Northwest; Society of Automotive Engineers; Royal Aeronautical Society; Wissenshaftliche Gesellshaft Fur Luftfahrt.

Present Occupation: Chief Engineer, Boeing Airplane Co.

Address: Boeing Airplane Co.; home, 7305 - 25th Ave., N. W., Seattle, Wash.

William Thomas Thomas

THOMAS, WILLIAM THOMAS, Consulting Engineer; born, Rosario, Argentine Republic, Sept. 18, 1887; son of Thomas Thomas and Olive (Wolcott) Thomas; married, Olive Rebecca Wolcott, April 16, 1913.

Educated: Dulwich Preparatory School; Dulwich College (England); Central Technical College, London (Engineering); A.C.G.I. 1908, Civil and Mechanical Engineering.

Professional: Shop experience with British Westinghouse Co., Trafford Park, England, 1903-1904; drafting and designing experience with Herring-Curtiss Co., Hammondsport, N. Y., 1909; commenced aeronautical experiments in 1909 at Hammondsport and later at Hornell, N. Y.; founded firm of Thomas Brothers.

Aeronautical Activities: 1911, Founded firm of Thomas Brothers; 1912, President and founder of Thomas Bros. Aeroplane Co.; 1915, President Thomas Aeromotor Co. at Ithaca, N. Y.; Vice President and Manager, Airplane Department, Thomas-Morse Aircraft Corp. during the war.

Member: Society of Automotive Engineers; Aero Club of America.

Present Occupation: Vice President and Consulting Engineer, Thomas-Morse Aircraft Corp.

Address: 510 E. Seneca St., Ithaca, N. Y.

Ord Preston

PRESTON, ORD, Banking; born, St. Helena, Calif., Aug. 15, 1874; son of Albert William Preston and Mary Elizabeth (Ord) Preston; married, Frances J. Converse, June 7, 1902 (Died, Sept. 1, 1911), Carolyn M. Murray, Dec. 4, 1912.

Educated: Phillips Academy, Andover, Mass., 1894; A.B. 1899, Yale University.

Professional: Clerk in New York Stock Exchange Brokers office, 1900-1905; Member, New York Stock Exchange, 1905-1912; 1912 to date, Director, Washington Gas Light Co.; 1912 to date, Director, Union Trust Co., Washington, D. C.

Aeronautical Activities: 1st Lieut., Air Service, S.R.C., Jan. 1918; Captain, Air Service, Aug. 1919; Major, Air Service, S.R.C., April 1919; Executive Section, D. M. A.

War Service: As above.

War Honors: Special letter of commendation from Director of Air Service.

Member: University Club (N. Y.); Metropolitan and Chevy Chase (Wash.).

Present Occupation: Financial.

Address: 413 Tenth St., N. W.; home, 1822 R St., N. W., Washington, D. C.

Madison Bentley

BENTLEY, MADISON, Psychologist; born, Clinton, Iowa, 1870; son of Charles Eugene Bentley and Persis Orilla Bentley; married, Emma V. Snelling, 1897.

Educated: Adelphi Academy, Brooklyn, N. Y.; B.S. 1895, University of Nebraska; Ph.D. 1898, Cornell University.

Professional: Banking, 1887-1890; Psychologist, 1898 to date.

Aeronautical Activities: President, Aviation Exam. Board, Cleveland, Ohio, Dec. 1917 to March 1918; President, Aviation Exam. Board, Boston, Mass., Sept. to Dec. 1918; member, Aviation Exam. Board, Los Angeles, Calif., April 1918; attendant, School for Aviators, Adjutants, etc., Columbus, Ohio, May 1918; research officer, Hazelhurst Field, Mineola, N. Y., May to Sept. 1918.

Member: National Arts Club (N. Y.); American Psychological Association.

Present Occupation: Head of Department of Psychology, University of Illinois.

Address: 209 University Hall, Urbana, Ill.

Charles Herrick Hammond

HAMMOND, CHARLES HERRICK, Architect; born, Crown Point, N. Y., Aug. 8, 1882; son of Charles Lyman Hammond and Mary Electa (Stevens) Hammond; married, Marion Eugenia Rogers, Oct. 4, 1911.

Educated: Chicago Grammar School; Hyde Park High School; Chicago Manual Training School; B.S. in Architecture, Armour Institute of Technology.

Professional: Practical Architecture in Illinois since 1907.

Aeronautical Activities: Started training in Aug. 1918 at Bolling Field; completed training at Carruthers Field, Jan. 1919.

Flying Rating: Reserve Military Aviator.

War Service: Commissioned Captain, Nov. 1917, Aviation Section, S.O.R.C.; commissioned Major, A.S.A., Oct. 1918; commissioned Major, Aviation Section, S.O.R.C., April 1919.

Member: American Institute of Architects; University Club.

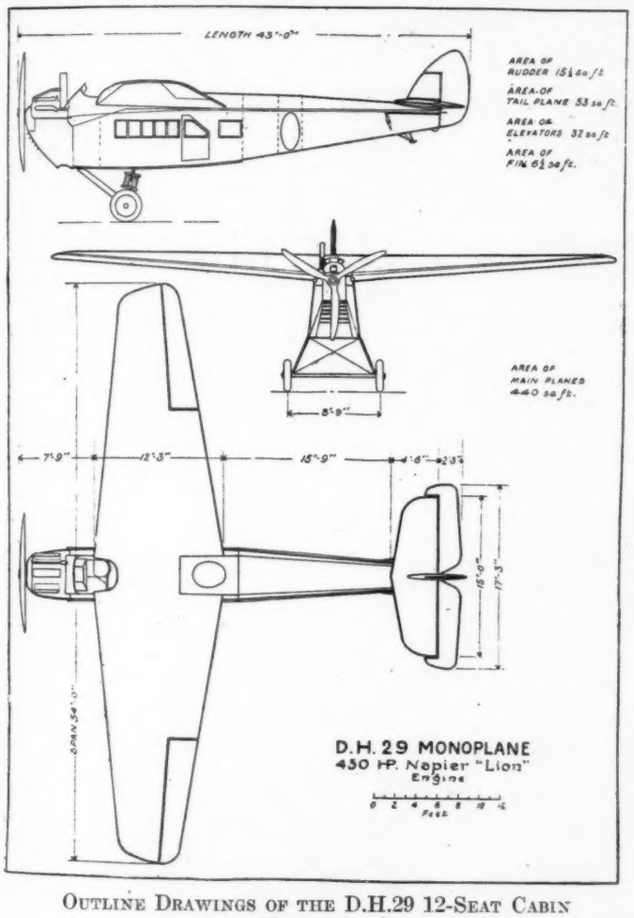
Present Occupation: Architect.

Address: 643 Van Buren St.; home, 1335 East 52nd St., Chicago, Ill.

The DH-29 Commercial Monoplane

Captain de Haviland's name is so familiar to our readers as the designer of the DH-4, the DH-9 and the DH-18 airplanes, that particulars regarding his latest creation, the DH-29, should elicit considerable interest, the more so as this is the first modern British cantilever monoplane.

The DH-29 is a commercial 12-seater airplane, fitted with a 450 hp. Napier "Lion" engine. In the design of this machine Captain de Haviland has attempted to produce a cantilever monoplane of high performance, that is, of both great carrying capacity and high speed, as against the German machines of this type which are rather deficient in the latter quality. For this reason the wing section chosen for the DH-29 is one which resembles very closely the profiles used in propeller construction, as may be seen in the front elevation given in the



OUTLINE DRAWINGS OF THE D.H.29 12-SEAT CABIN MONOPLANE
Courtesy of Flight

accompanying outline drawings. This wing section has practically a flat under-surface, so that the depth available for spars is equal to that of German cantilever wings having a much greater camber, and also a much greater drag. Furthermore, to limit the thickness of the section, the wings have a very large chord at the roots, whence they taper considerably toward the tops, both in chord and in depth. This arrangement also permits of a reasonably high aspect ratio without requiring unduly heavy wing spars.

The resultant wing has a highly efficient section, giving both a high lift and a high maximum *L/D* ratio, and carrying a large useful load at a high speed. This will be better understood with reference to the DH-18, which, fitted with the same engine, has but slightly less span and weight than the DH-29, but carries only nine persons as against twelve for the monoplane with practically the same performance. While the DH-29 has a higher wing loading than the DH-18, the weight per unit area of the cantilever monoplane is less than that of the biplane, a fact which explains the higher pay load per horsepower of the DH-29. Incidentally, the wing area of this 12-seater monoplane is practically identical with that of the DH-4—which is merely mentioned to show the progress achieved in airplane design during the last three years.

The following description of the DH-29 is given by courtesy of *The Aeroplane*.

Wing Construction

The construction of the wing is simple and cheap to manufacture. There are the usual two main spars, of box section, with spruce top and bottom members, and with three-ply sides, glued and screwed together. These three-ply sides are stiffened at frequent intervals with small square section spruce struts, which butt at top and bottom on the spruce longitudinals and are glued and screwed to the three-ply. At still greater intervals there are solid spruce bulkheads. There is no lightening out or channeling in any of the main members of these spars.

The two spars of each wing are connected by a system of drift bracing somewhat similar to that of the normal type of wing. But in place of the usual central drift struts between spars there are N struts. These have their two parallel members horizontal, at top and bottom of the spars, with the inclined member acting as a cross bracing.

It will be seen that this bracing acts somewhat similarly to the so-called incidence bracing of a biplane, in that it keeps the vertical axes of the spars rigidly parallel one to another, just as incidence bracing maintains parallelism between interplane struts. The drift wiring is of stranded cable, and is double, one set lying in the plane of the upper drift struts and one in the plane of the lower drift struts. Thus, front and rear, top and bottom members of the box spars are braced together exactly as are top and bottom, front and rear spars in a biplane, with the sole difference that the place of lift and landing wires is taken by the three-ply sides, and the incidence wiring gives way to the above mentioned inclined strut.

The wing structure is completed by ribs of spruce and three-ply, notable only for their great dimensions and by a trough of thin three-ply reinforced by spruce strips forming the leading edge. The whole wing is covered with doped fabric in the usual way.

The ailerons are unbalanced, hinged to the rear spars. The aileron control is unusual. The control cables run out through the wings and, opposite the center of the aileron, are coupled to a three-armed rocking lever, one arm nearly at right angles to the arms to which the cables are attached. This third arm is coupled to a push and pull rod, which runs to the single aileron king-post on the underside of the wing. A somewhat similar arrangement is used for elevator controls.

The wings, in two halves, are attached to the upper edge of the fuselage, the spars passing across to the center line and butting there. Behind the rear spar the wing falls below the fuselage contour on each side.

The Fuselage

The fuselage in form resembles that of the well-known DH-18. The nose which is a separate unit, carries the engine installation, which is readily detached as one unit on undoing four bolts, one at each corner. The front end of the fuselage proper consists of a fire and sound-proof bulkhead. From this the upper surface rises fairly steeply to a pilot's cockpit, which is in line with the leading edge of the wings. This cockpit seats two, pilot and mechanic, side by side.

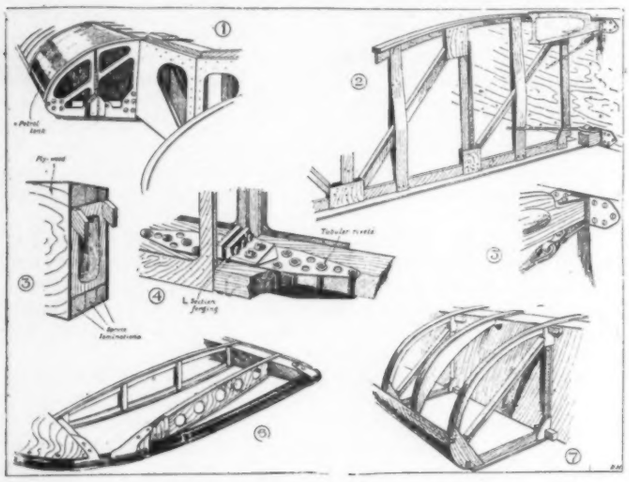
From the cockpit to aft of the trailing edge of the wings the fuselage forms a cabin, which is separated from the cockpit by a second bulkhead, pierced by a doorway giving access to the cockpit. This cabin is lighted by windows along its whole length on both sides, and by roof lights worked into the top surface. It is very roomy and has sufficient headroom for anyone of ordinary height to stand upright in.

An entrance door is fitted on the port side, below the trailing edge of the wing, and aft of the door is a further cabin space which can be used either for luggage or for any of those conveniences for which the exigencies of commercial service may call. This cabin is a three-ply covered box free from wire bracing.

Behind the cabin the body performs merely the usual functions of a tail-carrying girder and is normal in form and construction.

The tail consists of the usual tail plane, divided elevators, fin and balanced rudder. The whole tail is like the wings, self-supporting and devoid of bracing wires.

The undercarriage is extremely similar to that used on the DH-18 with such success, that is, it is a modification of the standard vee type. The front strut of each vee is fitted with



DETAILS OF THE DH-29 WINGS: (1) LOCATION OF THE RIGHT HAND FUEL TANK. (2) RIB CONSTRUCTION. (3) SPAR CONSTRUCTION. (4) JOINT OF WINGS. (5) COMPRESSION STRUT ATTACHMENT. (6) WING TIP CONSTRUCTION. (7) CONSTRUCTION OF LEADING EDGE.
Courtesy of Flight

a universal joint at its junction with the fuselage, and the rear strut is telescopic, with a shock-absorber of elastic interposed between the mutually sliding members. The bases of the vees are joined by a rigid axle, carrying a pair of amply dimensioned Palmer wheels and tires.

The Engine Unit

The engine, which, as already mentioned forms with its bearers, radiators, etc., a separate and detachable unit, is of the Napier "Lion" type. A supply of gasoline is ensured by two fuel tanks enclosed in the leading edge of the wings, which provide direct gravity feed to the carburetors. The radiator, as in the DH-18, is carried in an inclined position below the engine, and shielded by variable shutters.

In preliminary trial flights made by Captain de Haviland at Stag Lane the machine was found to handle extremely well, particularly as regards the lateral controls. Also, there was a peculiar absence of those minor vibrations which are usual in all aircraft, the machine having a markedly solid and rigid feel.

But one rather curious trouble was encountered. As the machine was originally built, the nose of the fuselage was nearly symmetrical as regards the curvature of top and bottom surfaces, and the center line of the propeller in front view was approximately central in the fuselage. It was found that as a result of this position of the propeller the pilot's cockpit was in the region of the most intense slip stream, that it was impossible to make a windscreen to stand up to full power conditions, that the pilot's head was nearly blown off, and that the Cellon roof lights in the cabin were blown in. Also owing to disturbed flow over the central part of the wing, there was at least a suspicion that the performance was being adversely affected.

In consequence a new nose was built which carried the engine some 20 in. above its original position, and thus evaded the whole trouble. It is here to be noted that, thanks to the unit engine installation embodied in the design, this involved no alteration of the fuselage proper. With the normal type of construction, engine bearers built into the fuselage framing, such an alteration would have been a much more serious undertaking.

Specifications

Pending the results of the official tests of the machine at Martlesham Heath, the DeHaviland Co. has not yet made public the actual performance of the DH-29, but the following specifications are available:

Span	54 ft.
Overall length	43 ft.
Total wing area	440 sq. ft.
Tail area	85 sq. ft.
Wing chord at root	12 ft. 4½ in.
Wing chord 20 ft. from root	6 ft. 9¼ in.
Span of tail	16 ft. 10½ in.
Chord of tail at root	6 ft.
Chord of tail at tip	4 ft. 6 in.
Area of tail plane	53 sq. ft.
Area of elevators	32 sq. ft.
Area of vertical fin	6½ sq. ft.
Area of rudder	15½ sq. ft.
Weight empty	4350 lb.
Weight loaded	7500 lb. (estimated).

Aero Club of Massachusetts

The Aero Club of Massachusetts which comprises nearly 300 pilots opened its new clubrooms in the Hotel Bellevue, with an informal smoker on Nov. 8. Maj. Edwin B. Lyon, air officer of the First Corps Area, and Lieut. R. C. Moffat, who is in charge of the Air Service field at Framingham, attended the house-warming.

The Massachusetts club was formed in 1919, and since its foundation has held many meetings with a view to stimulating interest in aeronautics and keeping the former Army men themselves interested. Its first home was at the Architectural Club at 16 Somerset street, and it is the club's ambition eventually to own a building. The present quarters, however, have many advantages and have been attractively arranged. In the first place the new rooms are conveniently located and members have all the hotel facilities. There are a loungeroom, a writing room and a cardroom. The decorations, although simple, are entirely appropriate. Two paintings by John Lavalle of Boston, a member of the club, hang in the loungeroom. In addition there are several photographs of New England pilots killed in the war, but remembered for their achievements. An enlarged photograph of Norman Prince, founder of the Lafayette Escadrille, has the place of honor in the writing-room, while above the doorway leading to the cardroom is a photograph of Lieut. Samuel P. Mandell. It is the hope of the officers that the Aero Club of Massachusetts will attract all pilots now residing in the State to its ranks.

At present the club is advocating the establishment of an airdrome in East Boston and has appointed a landing field committee as follows: Nathan Heard, Captain Reginald Belknap, U. S. N.; Norman Cabot, representing the Aero Club of New England; Roger Armory, Professor E. P. Warner of the Massachusetts Institute of Technology, Charles A. Woolley, representing the Archie Club, and E. A. Terhune, representing commercial aviation. A. K. Warren of Salem is its secretary.

High Intensity Beacon on Staten Island

The Sperry Gyroscope Co. has erected a high intensity vertical beacon at Tompkinsville, Staten Island, about 100 ft. in from the shore and 1,000 ft. eastwardly from the great Municipal Ferry Docks connecting with South Ferry, Manhattan. The light will be vertical over this spot, gradually waving between 10 and 15° each side of the vertical, making four beats a minute. The Lighthouse Commission is issuing a circular requesting observation on this beacon. Pilots of the U. S. Air Service are requested to make observation at the first opportunity and report to the Chief of Air Service as to the observation possible under the various weather conditions existing over Staten Island.

Organization of Naval Bureau of Aeronautics

An outline of the organization and of the distribution of duties in the Bureau of Aeronautics, Navy Department, which was recently created by Act of Congress, is contained in Circular Letter No. 1 issued by Rear Admiral Moffat, Chief of the Bureau. This letter reads in its essential parts as follows:

The organization of the Bureau of Aeronautics shall consist of four divisions:

(1) Plans
(2) Administration
(3) Material
(4) Flight.

The Chief of Bureau as the head of the organization is responsible to the Navy Department for all portions of the Bureau's work.

The Assistant Chief of Bureau shall be the principal adviser of the Chief of Bureau in all matters of aeronautic policy. In addition, he shall conduct such inspections of aviation activities as may be directed by the Chief of Bureau, after authorization, where necessary, by the Chief of Naval Operations.

The Executive Aide shall be the executive assistant to the Chief of Bureau, his principal duty being the co-ordination of activities involving interdependent action by two or more divisions of the Bureau.

Plans Division

The duties of this division are as follows:

(a) Making proposals to the Chief of Bureau on the types and military characteristics of all aircraft and the types of all special aviation appliances; in this work the assistance of the Material Division may be called upon as necessary. Upon approval of proposed types and military characteristics by the Chief of Bureau, the Head of the Plans Division shall co-operate with the Head of the Material Division in the preparation of sketches, models, data and other exhibits for presentation to the General Board.

(b) Report to the Chief of Bureau the existing shortcomings of Naval aircraft and special aviation appliances, with recommendations as to the relative urgency of experimental and development work which will lead to improvement in types and military characteristics that are unsatisfactory.

(c) Making recommendations to the Chief of Bureau as to numbers of new aircraft of each type to be procured and the rate of production required; making similar recommendations in regard to the scope of new construction at shore stations.

(d) Preparation of recommendations on the organization of aircraft units afloat; recommendations on the organization at all aeronautic shore establishments.

(e) Preparation of recommendations for the distribution of available aircraft and the assignment of air divisions, squadrons and detachments. Compilation of information on the classes, strength and distribution of Army air units that may be used to reinforce Naval air operations.

(f) Preparation of data and recommendations for coordination of aeronautic plans with the War Plans and for such other aeronautic planning that may be called for by the Chief of Naval Operations.

(g) Conduct the final trials of aircraft to determine their suitability for the Naval Service.

(h) Keeping the records of all military inspections made by the Bureau.

Administration Division

The duties of this division are as follows:

(a) General supervision of the financial and legal affairs of the Bureau, including compilation of recommendations for estimates for appropriations, and recommendations for allotments of all funds under the Bureau's control. This division shall be assisted in this work, as may be necessary, by the other divisions of the Bureau.

(b) Collecting and disseminating aeronautic information; preparation of press releases; cognizance of the authorized activities of the Bureau in connection with legislation.

(c) Office assignment and management; supervision of the routing and filing of correspondence; custody of central office files and records.

(d) Preparation of the Bureau's internal organization and administration orders and instructions and compilation and alterations of the Bureau's manual, assisted, as may be necessary by the other divisions of the Bureau. Preparation of recommendations on all other matters in connection with aeronautic administration that may be called for by the Chief of Naval Operations.

(e) Supervision of inter-Bureau and inter-Departmental administrative affairs.

(f) Supervision of the employment and distribution of the civil personnel required for aeronautic activities.

Material Division

The duties of this division are as follows:

(a) Supervision of the design of aircraft and all material within the cognizance of the Bureau that is used in connection with areonautics. Criticism of the design of public works and public utilities at aeronautic shore establishments. Criticism of designs of aeronautic accessories prepared by other Bureaus. Supervision of all aeronautic research work within the cognizance of the Bureau and cooperation with other bureaus, departments or organizations of the Government that conduct aeronautic research work.

(b) Control of the production and procurement of aircraft and, within the limitations prescribed in Reference (b), all other material required for aeronautic purposes.

(c) Control of the maintenance, survey, repair and salvage of aircraft and, within the limitations prescribed in Reference (b), all other material required for aeronautic purposes.

(d) Compilation of information and statistics required for efficiency and economy in the design, production and maintenance of aeronautic material.

(e) Study of the subject of war-time production and supply of aeronautic material in cooperation with other departments of the government that employ aircraft.

(f) Control of all aeronautic experimental work within the limitations prescribed in Reference (b) and sub-paragraph (a) in the duties of the Plans Division.

(g) Cognizance of all inspections and tests required in the production of all aircraft and, within the limitations prescribed in Reference (b), all other material required for aeronautic purposes.

(h) Cognizance of the policy of upkeep and operation of Naval Aircraft Factories and aeronautic experimental stations. Cognizance of the policy of upkeep and operation of Helium Plants in so far as they come under Naval cognizance.

(i) Cognizance of the upkeep and operation of public works and public utilities at aeronautic shore establishments and repairs to same within the capacity of the force employed.

Flight Division

The duties of this division are as follows:

(a) Preparation of recommendations on all matters pertaining to aeronautic training of commissioned and enlisted personnel, active and reserve; primary and advanced flight training; ground training.

(b) Maintenance of information files on the aeronautic experience and qualifications of officers who are, or have been, detailed to duty in connection with aeronautics.

(c) Preparation of recommendations for details of officers for duty in connection with aeronautics.

(d) Preparation of recommendations for the distribution in the various ratings (or ranks) of the enlisted personnel required for aeronautic activities.

(e) Maintenance of commissioned and enlisted complement charts of all aircraft operating units, aircraft carriers and tenders, and aeronautic shore establishments.

(f) Compilation of the doctrine and the tactical and communication instructions for all classes of aeronautic units; preparation of recommendations for air operations required

for the development of air tactics; safety rules and precautions; air, beach, field, and flying deck regulations.

(g) Compilation of information on the progress in tactical development of all Naval air units and, in so far as it is practicable to obtain it, the same information on other air units, both at home and abroad.

(h) Preparation of recommendations on all matters in connection with aeronautic operations that may be called for by the Chief of Naval Operations, excepting operation of Naval Aircraft Factories and aeronautic experimental stations.

(i) Control of aerological and aerial photographic work under the direct cognizance of the Bureau. Preparation of recommendations for aerological and aerial photographic activities not under the direct cognizance of the Bureau.

Fokker Performance on European Air Lines

According to a statement issued by the Netherlands Aircraft Manufacturing Co. of 286 Fifth Avenue, New York, the maximum efficiency on the air lines of Europe is being given by the F-3 five-passenger monoplanes designed and manufactured by Anthony H. G. Fokker, in Amsterdam. These are the same planes as those being shown by the Netherlands Aircraft Manufacturing Co. at Curtiss Field, Mineola, L. I.

The European record is all the more striking when it is known that the planes used carried an average of 1,000 lb. of passengers, freight or mail on each trip and attained their high average of efficiency with motors of only 240 hp. The performance of this type of plane has induced several of the most ably managed air lines to scrap their converted war planes and entirely refit with Fokkers.

The following summary shows that on four air lines the planes flew 166,600 miles without accident or loss of any kind, and that a total of 693 out of 725 trips were successfully completed.

LINE	Route in Miles	Number of trips scheduled	Number of trips carried out	Miles flown	Accidents, involving injury to persons or loss of freight
Number 1	265	243	230-95 per cent	61,000	nil
Number 2	280	186	176-95 per cent	50,000	nil
Number 3	180	242	233-96½ per cent	42,250	nil
Number 4	270	54	54-100 per cent	13,350	nil
				166,600	

No. 1—London-Rotterdam-Amsterdam V.V.
Period: Apr. 14-Aug. 28.
No. 2—Rotterdam-Amsterdam-Bremen-Hamburg, V.V.
Period Apr. 14-Aug. 1.
No. 3—Danzig-Konigsberg-Memel, V.V.
Period: Apr. 1-Aug. 1.
No. 4—Extended during August to
Danzig-Konigsberg-Memel-Riga, V.V.
Period: up to September 1.

Total mileage of Fokker F-3's during 1921 now exceeds 300,000 miles without accident.

SUMMARY OF OFFICIAL STATISTICS ON THE OPERATION OF THE AIR LINES BETWEEN LONDON AND THE CONTINENT

Jan. 1 to Sept. 17, 1921

Routes in Operation	Distance in miles	No. of Journeys	Passengers carried	Journeys carrying mail	Journeys carrying freight	Journeys completed to schedule	Types of Airplanes used
Paris-London	240	970	4039	371	642	870-90 per cent	Breguet Farman Spad Salmson ..
London-Paris	240	944	3970	262	282	880-93 per cent	De Haviland Bat Vickers
London-Brussels	210	248	285	140	145	234-94½ pct.	De Haviland Farman
Brussels-London	210	216	343	168	166	196-91 per cent	Handley-Page
London-Amsderdam	265	143	171	127	133	137-96 per cent	
Amsderdam-London	265	142	243	133	120	132-93 per cent	Fokker F-3
Totals		2663	9051	1191	1588	2449-92 per cent	

London-Amsderdam line commenced operating April 15, 1921. Mileage of journeys completed was 582,000. During this period not one passenger was killed or seriously injured.

Mr. Fokker recently produced a larger single-engined cabin monoplane known as model F.4. This machine is fitted with a 420 hp. Liberty engine and carries ten passengers and pilot beside fuel for from 4 to 6 hr. The high speed is 105 m.p.h.

THE CONTEST COMMITTEE of the AERO CLUB OF AMERICA

Requests all owners (individuals or companies) of aircraft in the United States to register in order that the Committee may

1. Send, gratis, the Aero Club's Contest Rules for 1922, and notices of proposed aviation meets.
2. Assist local Clubs in organizing contests best adapted to the types of airplanes in their locality.
3. Have a record of airplanes and pilots available throughout the country in times of emergency.

USE THIS FORM.

CONTEST COMMITTEE, AERO CLUB OF AMERICA;
11 East 38th Street, New York City

Date .....

I / We) have ..... (Give number) (Airplanes) (Seaplanes) (Flying Boats) (Airships) (Free Balloons)

Make and Model .....

Motor, Make and Model .....

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Helium for Airships

In the course of an interview with a correspondent of a British newspaper shortly following the recent ZR2 airship disaster, Maj. P. E. Van Nostrand, of the Balloon and Airship Division, Office of the Chief of Air Service, who was to have returned to America aboard the big dirigible, asserted that airships can be made safe, and that while helium is the best gas known for airships—and he hoped the time will come when not only naval and military airships but commercial airships as well will be filled with helium—gasoline rather than hydrogen is the greater menace to the safety of airships. He is of the opinion that hydrogen can be used, and used safely, pointing to the fact that the hydrogen gas in the latter part of the ZR2 apparently did not explode, but came down intact, demonstrating that buoyant gas, if it stays in the bag, is a help rather than a danger. He added that if the ZR2 had been filled with helium, the result of the accident would have been little more than a casual wetting for the men aboard her—provided a less explosive fuel than gasoline had been in use.

Supply Still Limited

At the present time, in view of the fact that the supply of helium is very limited and difficult to obtain, the problem is to find a less volatile liquid for burning than gasoline, and this, in Major Van Nostrand's opinion, is an easier proposition to obtain than helium.

Commercially pure helium has 92.6 per cent lift of pure hydrogen, and being absolutely inert has no deteriorating effect upon balloon fabrics, and is safe from combustion under all conditions.

Up to April, 1918, helium had been obtained only in extremely small quantities, and for scientific purposes only—the total amount probably not exceeding 100 cubic feet, at a cost of about $1,700 to $2000 per cubic foot. The most promising fields thus far discovered are located in Texas, Kansas, and Ohio. It is believed by scientists that other sources of supply will be discovered, susceptible of development for the production of helium in balloon quantities, as the result of exploration work. At the present time such an exploration program is being actively prosecuted by the government.

After our entry into the war three experimental plants for the production of helium from natural gas obtained from the Petrolia pool at Petrolia, Texas, were erected. Two of these, known as Plants No. 1 and No. 2, were located at Fort Worth, Tex., the gas being supplied through a pipe line from the former place, and the last plant, known as Plant No. 3, was established at Petrolia.

Cost of Production

The cost of producing one cubic foot of helium in a mixture of 92 per cent purity in Plant No. 1, the most successful plant to date, was about 39 cents, showing the extremely remarkable reduction in the price of producing helium, especially when the fact that this was an experimental plant and not of such proportions as to give lowest cost, is taken into consideration.

After helium of 92 per cent purity was produced in Experimental Plant No. 1, the Navy, acting for the Army and Navy, entered into a contract with the Linde Co. for the erection of a large production plant at Fort Worth. Latest figures on the cost of producing helium in the new production plant, as estimated by the Navy Department, which is in charge of its operation, show that 94.5 per cent helium costs $150.01 per 1000 cu. ft., and 92.9 helium as $280.12 per 100 cu. ft.

Helium provides the United States with a weapon of warfare which is apparently not available to any other nation, because nearly all of the practical supplies of helium so far discovered are contained within the borders of this country. On account of the anticipated further reduction in the cost of this product below the present figure, it would seem advisable that the Government should not relax its endeavors to further the exploration and development of this gas, for with an adequate supply of helium the future of the military airship in this country would be assured.

The average production of helium in this country at the present time is such that, when compared with the production figures in the past, would indicate that helium production is making encouraging progress.

One of the most important problems that will have to be solved in connection with the use of helium in lighter-than-air craft is the question of its loss by expansion and consequent valving. Due to the excessive cost of this gas, a radical departure will have to be made in the method of handling the gas pressure than obtains at present with automatic valves in Type R balloons and airships. The Navy is preparing to conduct aerial experiments with helium in an airship of the C Type, and the U. S. Army Air Service will do likewise upon the completion of an airship that is being designed particularly for the use of helium.

With regard to the repurification of helium, the Army Air Service has two plants under construction for conducting this work—one the Railroad Repurification Plant in Washington, and the other a stationary Repurification Plant at Langley Field, Hampton, Va., both of which are under the jurisdiction of the Bureau of Mines.

Helium Repurification Plant

The Railroad Repurification Plant at Washington is now approaching completion, and consists of two cars, one utilized for producing power for the operation of the apparatus contained on the other car. This apparatus, through the process of refrigeration, absorbs the impurities (consisting principally of air—contained in the helium. The capacity of this plant is approximately 2000 cu. ft. per hour. Being built on standard railroad cars, the plant is capable of being transported to any section of the country upon short notice. It is intended to utilize it for repurification of helium in use at isolated stations where it is inadvisable to locate permanent repurification plants, the impure helium, at these stations being allowed to collect for a period of six months or so, stored in cylinders and then repurified upon the annual or semi-annual visit of the Railroad Repurification Plant.

The plant at Langley Field, Va., which was designed and developed for the Army Air Service by Dr. Harvey M. Davis, Mechanical Engineer, Harvard University, has a capacity in excess of 2000 cu. ft. per hour, and the method used is the liquification of impurities from the helium. Dr. Richard B. Moore, Chief Chemist of the Bureau of Mines, is in charge of this plant, assisted by Mr. Ferris of that Bureau, the latter being stationed at Langley Field. The plant is operated in conjunction with the hydrogen plant at this station.

It is anticipated that both the Railroad Repurification Plant and the plant at Langley Field will be ready for operation about the first of next year. The successful operation of these plants is assured, inasmuch as the laboratory designs which have been tested out have proved very successful.

Airship C-2 to Experiment with Helium

Plans are in progress to make practical use of helium in Navy airships in the near future. An immediate start is to be made in the experimenting with this gas at the naval air station, Hampton Roads, Va., where a non-rigid airship of the C class will be inflated.

This experimentation is being conducted in connection with tests in regard to buoyancy, valve control, permeability of airship fabric, and methods of handling helium in connection with all types of lighter-than-air craft. This will be the first airship in the world to be so inflated, and it is expected that important data will be obtained. which it is hoped will be of considerable value in future employment of the gas. This is in accordance with the provisions laid down by the Aeronautical Board of the Army and Navy for the experimentation and development of lighter-than-air craft.

Foreign Aeronautical News

Australia

The first of the series of aerial mail services in Australia under control of the Commonweatlh was to be inaugurated on October 30 or, if subsequently fixed by the Minister of Defense, not later than November 30. While a limit of £25,000 has been placed by the government on the total amount of any tender, tenderers are to be given the option in forwarding parcels to maintain a greater or less number of trips than is provided in the conditions-contract. Tenderers must name two guarantees to the amount of £5,000 for the safety of mails and fulfillment of contract, and must specify the class of machines, number proposed to be provided, with their speed, radius, gasoline consumption, carrying capacity, etc. The scale of charges for passengers and freight will be subject to the Minister's approval.

England

An order has been issued directing that the R.A.F. Airship Base at Howden, Yorks, be closed down not later than March 31 next. This order is in conformity with the policy already announced of ceasing all further activities with airships for Service purposes, owing to the necessity for the utmost economy, and making existing airships available for civil operation. The airship personnel is being transferred to other branches of the R.A.F. and a number of officers from Howden have already begun courses of instruction in order to fit themselves for new duties.

O. P. Jones, a commercial pilot, must now hold the record for number of passengers carried by one pilot. Recently he passed the 10,000 mark, and it seems improbable that any other pilot has carried as many as 10,000 passengers. Mr. Jones began his work as a "joy ride" pilot in February, 1920, and his total to October 2 was 10,100. His Avro G.EASF has carried 8,000 passengers, which must be a record for small machines. He has visited over thirty different towns all over Great Britain, and has made return visits to some. He has given exhibitions and joy rides from all conceivable sites and in all kinds of weather.

France

It is understood that the Franco-Roumaine air line contemplates a regular service to Constantinople next spring. The route is to be flown in five stages, with stops at Strasbourg, Prague, Budapest and Bucharest, to be accomplished in 24 hr. This will be an important step in the accomplishment of the air route to the East. Moreover, the country is nearly all the way excellent for flying.

Germany

Civil aviation in Germany is confined to the use of about 125 ex-military machines, with the exception of certain civil type machines which that government has been allowed to operate. The German government has carried out the instructions of the Inter-Allied Commission of Control by prohibiting the flight to foreign countries of any of those ex-service aircraft, but internal services have been in operation on nine routes. Preparations are being made for a service between Munich and Lake Constance to be extended to Geneva via Zurich, in conjunction with a Swiss air transport company.

Duralumin, Goldbeater's Skin and Dope

According to the report of the Committee on Materials for Aircraft submitted to the N.A.C.A. at its annual meeting, Oct.6, the study of the fatigue resisting properties of duralumin are under way, a battery of six fatigue testing machines being in operation at the Bureau of Standards. A study of the resistance to repeated impact tests is also being conducted.

The committee has also reports that remarkable progress in the development of a substitute for goldbeaters' skin which is used in making the gas cells of airships. The substitutes are much cheaper and some are superior to gold beaters skin.

Progress is likewise being made in developing a cheaper dope for airplanes and the development of water-proof glue is also satisfactory.

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FACTS ON FLYING BOAT TRANSPORTATION

First Annual Report of Commercial Aviation Operations ever made in the United States compiled by the Aeromarine Airways for the Bureau of Aeronautics, Navy Department, Washington, D. C. For the Year ending October 27th, 1921.

From: AEROMARINE AIRWAYS, Inc.
1800 Times Bldg., New York City.

To: ADMIRAL W. A. MOFFETT,
Director of Naval Aviation,
Navy Building,
Washington, D. C.

Subject: First Annual Report of Commercial Flying Operations.

TOTALS

Passengers carried	6,814
Miles flown	95,020
Accidents	NIL
Mail and freight (lbs.)	29,002

The operation of the Aeromarine-Navy flying boats in the commercial transportation of passengers, mail and freight for the period commencing October 27, 1920 and ending October 27, 1921, is herewith submitted.

1. Six eleven-passenger flying cruisers of F5L type in operation carried 1,044 passengers 42,000 miles in the air and transported 24,002 lbs. of mail and 5,000 lbs. of freight and baggage, exclusive of crews.
2. Six Navy Coast Patrol five-passenger flying boats of HS2L type carried 4,762 passengers 34,920 miles in the air, exclusive of crews.
3. Three Aeromarine three-place flying boats carried 1,008 passengers 18,100 miles, exclusive of pilots.
4. Not a single passenger or employee was injured during these operations. The schedule was maintained throughout with the exception of four forced landings during adverse weather conditions which caused only slight delays. These delays were less than those suffered by railroads in slight snowstorms. The flying boat "NINA" was torn from her moorings one night in Havana Harbor during a terrific gale, blown against some rocks and damaged beyond repair. No one was aboard at the time.
5. The services maintained include Key West - Havana; Florida - Bahama Islands; New York, Atlantic City and New England ports; New York Sight Seeing; New York - Albany; Great Lakes region; Mississippi River Valley.

SUMMARY

The eleven-passenger Navy F5L flying boats operated in the Key West - Havana Service during the Winter months, after which four of them were laid up for the Summer. The remaining boat, "SANTA MARIA" then undertook a flight from Key West up the Atlantic Coast to New York, up the Hudson River, over Lakes George and Champlain to Montreal, along the Great Lakes to Chicago and thence by way of the Illinois and Mississippi Rivers to New Orleans, thence along the Gulf to Key West, a total distance of 7,000 miles.

Of the six HS2 flying boats four were in constant operation and two were in reserve. One of these boats made a complete circumnavigation of the Great Lakes flying 7,491 miles and carrying 500 passengers; another covered the New England States.

For operations during the coming year six of the Aeromarine-Navy eleven-passenger flying cruisers will be placed in operation on the Key West-Havana route and between Palm Beach and Miami and Bimini and Nassau; two other flying cruisers of the same type will be held in reserve for special chartered parties.

For the other services seven of the five-passenger Aeromarine-Navy HS2 type will be placed in active operation and ten others will be held in reserve for special charters.

Three of the Aeromarine three-place flying boats will be used for special services and special charters, with two of these same types held in reserve.

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